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ESSENTIALS OF
GENITO-URINARY & VENEREAL DISEASES
S.S. WILCOX, M.D.

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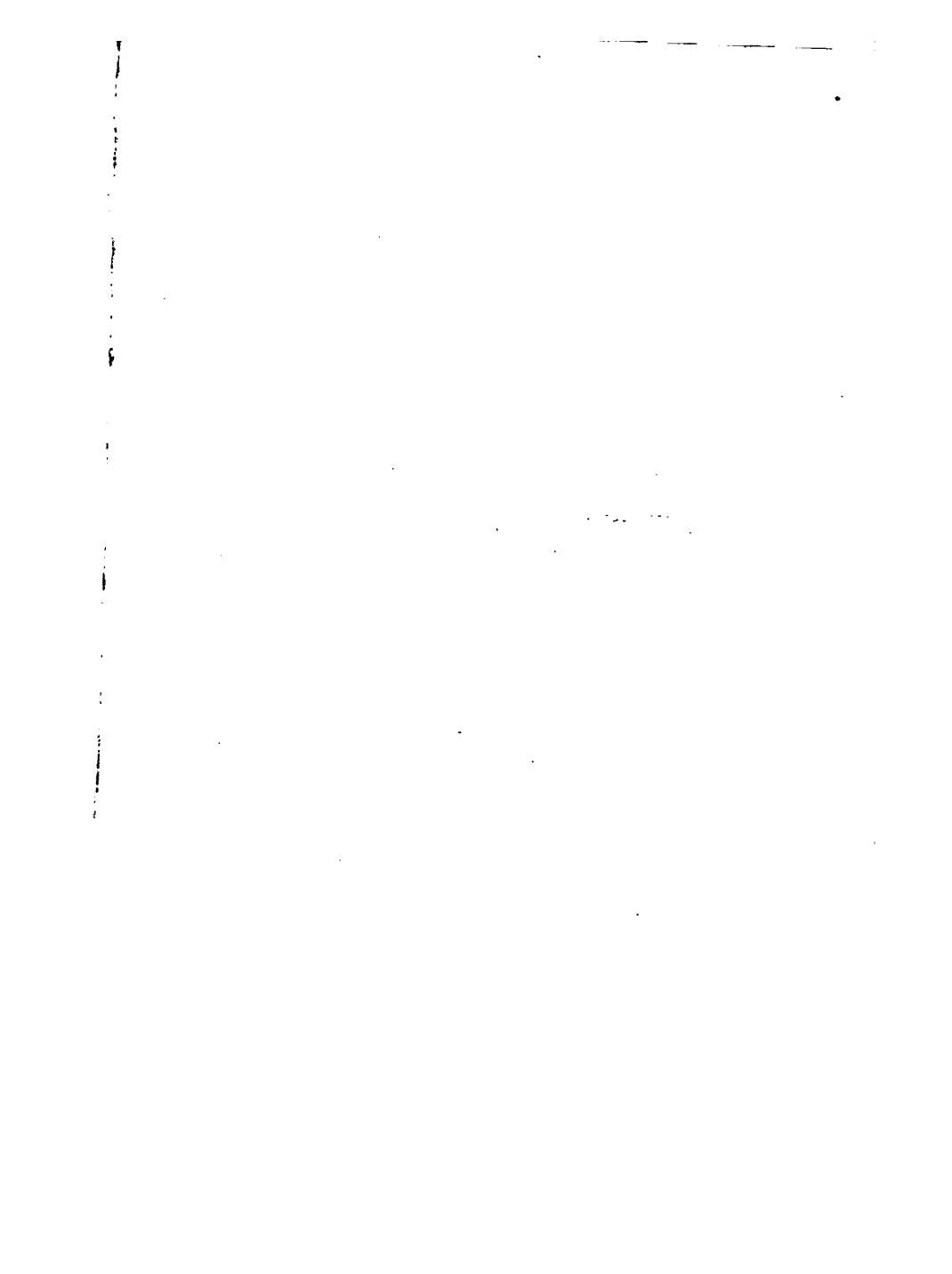
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ESSENTIALS
OF
GENITO-URINARY AND VENEREAL
DISEASES

ARRANGED IN THE FORM OF
QUESTIONS AND ANSWERS
PREPARED ESPECIALLY FOR STUDENTS OF MEDICINE

BY
STARLING S. WILCOX, M.D.

Lecturer on Genito-urinary Diseases at Starling-Ohio Medical College, Columbus,
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Ohio Medical College; Genito-urinary Surgeon to St. Francis
Hospital and to the Ohio Penitentiary

SECOND EDITION, THOROUGHLY REVISED

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PREFACE TO THE SECOND EDITION.

IN offering this, the second edition, the author has endeavored, as heretofore, to present the information upon the subjects therein contained in a manner up to date, practical, and trustworthy.

It is hoped that the second edition, like the first, will prove to be a valuable and ready reference book.

S. S. W.

COLUMBUS, OHIO.

PREFACE

IN writing essentials it is obligatory to present in a terse manner facts upon which the specialists in the subject are agreed, answering categorical questions dogmatically, in the interest of directness. The student having first learned that which he must know to acquit himself creditably, should subsequently, from the cyclopedic works of the masters, inform himself regarding matters still *sub judice*.

The text-books consulted while compiling this compend are those of Keyes, Taylor, White and Martin, Hayden, Morrow, Bangs and Hardaway, Lydston, Morton, Hyde and Montgomery, Da Costa, and Schmidt, from each of which an occasional terse sentence has been used without credit other than this.

I am indebted to Dr. W. K. Rogers for the questions and answers in regard to gonorrhea and syphilis of the eye ; and to Dr. Wm. D. Deuschle for those on syphilis of the nervous system.

S. S. W.

173 EAST STATE STREET,
Columbus, Ohio.

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ESSENTIALS OF GENITO-URINARY AND VENEREAL DISEASES.

THE URINE.

What points should be considered when examining the urine ?

The amount passed, the appearance, color, clearness, sediment, odor, reaction, specific gravity, change in normal ingredients, and the presence of abnormal substances.

What is the average amount of urine passed in twenty-four hours ?

The quantity of urine voided by a healthy adult in twenty-four hours averages 50 ounces. Profuse sweating or copious ingestion of fluid may cause considerable variation in the amount, but a lessened or increased amount is not pathologic unless it persists for some time and occurs irrespective of the above-mentioned causes. Cases have been reported where persons in health have passed only 3 ounces of urine daily, while others voided as much as 80 ounces.

How should urine to be examined be secured ?

Beginning at a certain hour—preferably in the morning—the patient should perform all micturition into a clean receptacle until the same hour the next day. This will give the quantity for twenty-four hours and furnish an average sample for examination. It is best for the surgeon to supply the bottle ; and in hot weather three drops of formalin may be put into it before delivery to the patient, with instructions that the bottle should be kept cool and corked.

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How may the urine appear ?

It may be clear (normal), turbid, or contain sediment. The turbidity and sediment may be caused by the presence of mucus, precipitation of the earthy phosphates, separation of the acid urates, by the presence of pus or fermentative changes.

What is the normal color of urine ?

Straw or amber color. Pale urine has a slight tinge of yellow, and indicates increase of watery elements. High-colored urine is yellowish brown and indicates concentration. Dark-colored urine ranges from deep brown to black, and may be due to blood, bile, or to the effects of drugs—such as carbolic acid.

What is the odor of normal urine ?

Aromatic. On standing, ammoniacal decomposition gives it a characteristic odor. A fruity odor, due to acetone, is peculiar to diabetes; spirits of turpentine gives an odor not unlike violets; while copaiba, the balsams, and santal oil impart their peculiar odors to the urine. Blood in considerable quantity produces an odor resembling "high game."

What is the reaction of normal urine ?

Acid. Greatest in the morning and least after meals. Blue litmus-paper is turned red by acid urine, depending on the acid phosphate of the alkalies, and red litmus-paper is turned blue by alkaline urine. The urine is alkaline sometimes after eating. This is unimportant. The ingestion of carbonates of the alkalies and earths, or organic salts, which change to carbonates in the organism, may cause the urine to become alkaline, or it may be rendered so from ammonium carbonate being formed by the decomposition of urea.

What does the specific gravity of the urine depend upon ?

The weight of the elements which it holds in solution. Normally it averages 1.015 to 1.020; the greater the amount of urine passed in a given time, the lighter is its specific gravity, and *vice versâ*. The specific gravity is taken with the urinometer. The amount of solids in the urine can be estimated by multiplying the last two figures of the specific gravity by

Haeser's coefficient, which is 2.33. This gives the number of grammes of solids in 1000 cc. of urine.

A small amount of urine with a high specific gravity means concentration from diminished fluid elements.

A small amount of urine with a low specific gravity indicates the excretion of a small amount of solids.

A large amount of urine with high specific gravity indicates that both the amount of urine and the solids are increased.

A large amount of urine with a low specific gravity often exists during convalescence from acute febrile diseases. If the condition is due to renal disease the affection is most commonly chronic interstitial nephritis.

What is the most important constituent of the urine?

Urea, which is the chief product of tissue-combustion. It is a crystalline body of neutral reaction, and so soluble that it is never visible in the urine. The amount passed in twenty-four hours is about five hundred grains.

How may the presence of urea be demonstrated?

By acidulating the concentrated urine with oxalic acid and examining under the microscope the oxalate of urea crystals formed by the combination. To examine the crystals carefully evaporate a drop of urine on the cover-glass and then inspect with the microscope. There will be seen characteristic rhombic prisms. The quantitative estimation of urea is determined from the volume of nitrogen given off in the decomposition of urea by hypobromite or hypochlorite of soda.

What is uric acid?

A bibasic acid, which, in the form of its salts (the urates), is a normal ingredient of the urine and, next to urea, the



FIG. 1.--Urinometer.

principal eliminant of nitrogen from the body. The quantity eliminated in twenty-four hours is from 7 to 15 grains.

If uric acid is present in considerable quantity the crystals fall to the bottom of the glass after the urine has stood for a long time. Uric acid may be separated by strongly acidulating the urine with hydrochloric acid, when, after standing for twenty-four hours, the uric acid will crystallize, appearing to the naked eye as small reddish-brown particles.

Microscopically they may vary in shape, but resemble rhombic plates, the most frequent being the whetstone, or

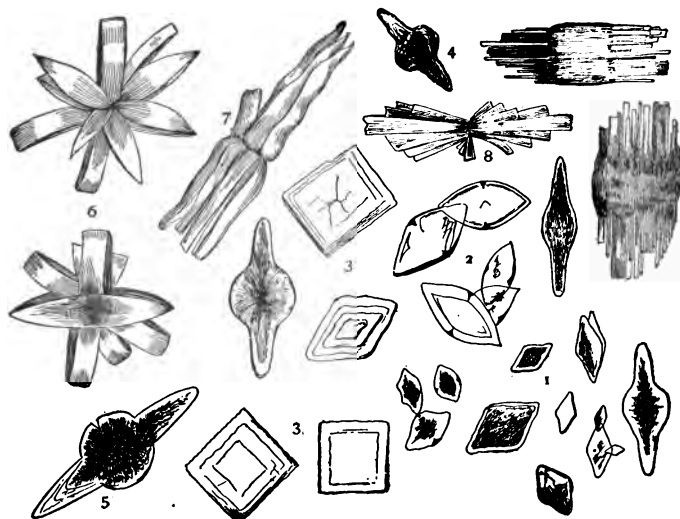


FIG. 2.—Forms of uric acid: 1, Rhombic plates; 2, whetstone forms; 3, 3, quadrate forms; 4, 5, prolonged into points; 6, 8, rosettes; 7, pointed bundles; 9, barrel forms precipitated by adding hydrochloric acid to urine (Ogden).

lozenge form, rounded off at their obtuse angles; other forms resemble sheaves, rosettes, combs, etc.

Name and describe three normal salts of the urine.

The chlorids, phosphates, and sulphates. These salts are principally derived from the blood, but the latter two are also the result of oxidation products from albuminoids and other bodies which contain phosphorus and sulphur.

Sodium chlorid, the principal one of this group, is excreted in amounts of from 150 to 250 grains in twenty-four hours, varying with the quantity ingested. A considerable diminution of the chlorids or their disappearance during sickness means a grave prognosis.

Give a test for the chlorids.

To a specimen of urine, in a test tube, add a few drops of nitric acid, and then, drop by drop, a solution of silver nitrate (25 gr. to 1 oz.) until no more precipitate forms. The precipitate will be dense and curdy if the chlorids are present in normal quantity, milky if they are diminished, and faint if almost or entirely absent. If the bulk of the precipitate is compared with that of a normal specimen the relative amount may be approximated.

Phosphoric acid is present in the urine as phosphates of the alkalies and alkaline earths, of which there are two-thirds of the former and one-third of the latter.

Phosphates of the alkalies are present principally as acid sodium phosphate; those of the alkaline earths, as phosphates of calcium and magnesium. The total amount of phosphoric acid normally eliminated in twenty-four hours is between 30 and 60 grains.

How can the earthy and alkaline phosphates of the urine be separated?

Add an alkaline hydrate, KOH, to the urine, heat to boiling-point, and the earthy phosphates are thrown down. Filter and add about one-third of magnesia mixture. The alkaline phosphates will be precipitated as ammonium-magnesium phosphate, termed triple phosphates, which appear prismatic, highly refractive, and look like little coffin-lids.

The sulphates are eliminated in quantities ranging from 25 to 40 grains in twenty-four hours, the greatest part being sulphates of alkalies, and the remainder sulphates of organic compounds.

Give a test for the sulphates.

Acidulate the urine with a few drops of hydrochloric or nitric acid and add a solution of barium chlorid (25 gr. to

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1 oz.); this will give a precipitate of barium sulphate, insoluble in water and acid.

What are the abnormal constituents of the urine ?

Bodies which owe their presence therein to pathologic conditions. The most important abnormal constituents are pus, blood-corpuscles, hemoglobin, albumin, sugar, cells, and casts.

What is pyuria ?

Pus in the urine. It depends upon, and therefore indicates, an acute or chronic inflammation somewhere in the genito-urinary tract, or communicating therewith. The sudden

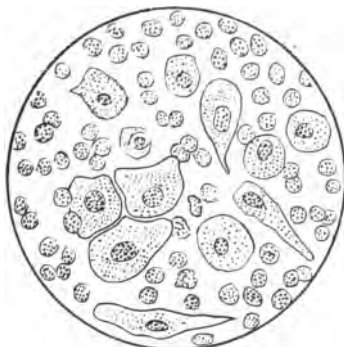


FIG. 3.—Pus corpuscles and epithelial cells.

appearance of a large quantity of pus in the urine indicates the bursting of an abscess into the tract.

Describe the pus corpuscle.

Pus corpuscles are round granular cells, about twice as large as blood-corpuscles, and contain from one to three nuclei. Rarely they are not round, but have various prolongations which show ameboid movement. If the inflammation has lasted for some time their outline is less distinct; when they take on a horseshoe shape, old pus is indicated. A moderate amount of pus renders the urine cloudy; a large amount, thick, viscid, and turbid.

In ammoniacal urine the pus corpuscles swell and coalesce, forming a homogeneous mass in which the nuclei alone can be seen. Such pus is slimy, flows like the white of an egg, and is easily mistaken for mucus.

Pus is distinguished from mucus in that the former turns ropy and thick by the addition of caustic alkalies; the latter, liquid and forms thin flakes.

To determine the presence of pus in the urine chemically the specimen is decanted, and a small piece of potassium hydrate added to the sediment. Upon stirring, any pus present will become a clear, tough, gelatinous mass.

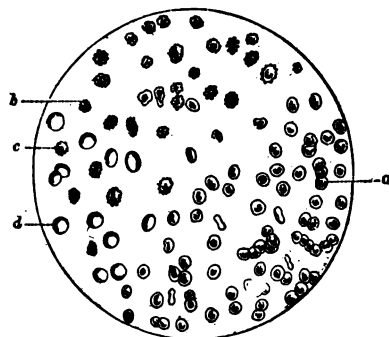


FIG. 4.—Blood-corpuscles: *a*, With biconcave depressions; *b* and *c*, contracted and crenated; *d*, swollen.

Microscopically, if the urine is acid, the pus looks like a heavy deposit; the pus cells appear as round, opaque, granular spheres. On the addition of a drop of acetic acid, under the cover-glass, the granular contents of the cell disappear, and the nuclei become more distinct. In acid urine, pus may be confused with the urates; in alkaline urine, with the phosphates. In acid urine the urates disappear by the application of heat. Should a residue form, it is acid urates, and disappears by the addition of some alkali, as KOH and heat; in alkaline urine the sediment disappears upon the addition of a few drops of acetic acid.

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What is hematuria ?

The presence of blood in the urine. Blood in the urine differs somewhat in appearance according to its origin. That from the renal parenchyma is well mixed with the urine and gives it a smoky appearance; that from the ureters appears as long semicircular clots and strings; that from the bladder and urethra appears in larger quantity, bright red, and settles in clots.

Blood in the urine is detected by the microscope. When the sediment is spread upon a slide the corpuscles appear biconcave and spheric, either single or grouped in rouleau form, or they may be crenated (in dense urine) or swelled, their biconcavity partly lost (water-logged), as in urine of low specific gravity, or (in ammoniacal urine) partly destroyed.

Describe hemoglobin in the urine.

Hemoglobin is the coloring-matter of red blood-corpuscles and may appear in the urine independently of the blood-corpuscles. It is caused by a solution of the stroma of the red blood-corpuscles in the blood leaving the diffusible hemoglobin in solution, which is secreted by the kidneys.

Hemoglobin may be detected by slightly acidulating the specimen of the urine in the test-tube with acetic acid and boiling. The coagulable albumin of the hemoglobin will coagulate and on subsiding be found as a reddish sediment at the bottom, the soluble hemoglobin having changed to insoluble hematin. Another method is to add a few drops of fresh tincture of guaiac to the specimen, agitate, and add a few drops of old spirits of turpentine. If hemoglobin is present the color will change to robin's-egg blue.

What conditions may produce albumin in the urine ?

Albumin may be present in the urine from the ingestion of albuminoids, edematous exudation, excessive blood-pressure in the kidneys; a lack of chlorids in the blood, from blood or pus mixed with the urine, from acute fever, and toxemia. The presence of albumin in the urine is not always, of itself, sufficient evidence of Bright's disease, but if it persists and the urine also contains casts and renal epithelium, kidney involvement probably exists.

Give two tests for albumin.

Heat Test.—Fill a test-tube half-full of urine (which should be filtered previously if it contains sediment), add 3 drops of acetic acid to eliminate the phosphates, and heat (heat will clear away the cloud due to urates before precipitation of the albumin) the upper third of the urine in the test-tube. If albumin is present there will appear a white cloud in the heated portion of the urine.

Nitric Acid Test.—Fill a cup-shaped sherry glass two-thirds full of urine. Tilt the glass so as to moisten its sides up to the rim, then by means of a glass tube allow 2 dr. of nitric acid to trickle gently down the tilted side of the glass so that it may pass down into the urine, sliding, as it were, along the glass, disturbing the urine as little as possible, and sinking to the bottom.

Gently tilt the glass to the level and there will appear a sharply-defined white zone between the fluids. The faintest possible trace of a zone represents $\frac{1}{12}$ of 1 per cent. by weight of albumin. The bottom of the glass can be seen through any zone of less than 1 per cent. If 1 per cent. or more is present the zone is opaque. About 2 per-cent. gives the zone a peculiar thick curdy appearance.

What does sugar in the urine indicate?

A constitutional rather than a local disease. A disorder of nutrition in which sugar accumulates in the blood and is excreted by the urine, the daily amount of which is increased. The most common cause of glycosuria is an alteration in the organism which prevents the proper metabolism of the carbohydrates. Sugar in the urine is not due to renal disease, and any small amount of albumin found associated with it is due to the passage of sugar through the kidneys. Sugar as glucose, in minute quantity—not more than $1\frac{1}{2}$ gr. in twenty-four hours—is not abnormal but persistent, and large quantities of sugar in the urine indicate diabetes mellitus. Less frequently sugar in the urine is caused by cerebral or nervous affections. In glycosuria the quantity of urine passed in twenty-four hours may reach 2 gallons or more. It is pale

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yellow, often greenish, with high specific gravity, usually 1030 to 1040, and the urea is abnormally increased.

Give two tests for sugar.

Fehling's Test.—To 1 dr. of liq. potass. in a test-tube add 4 gr. of tartaric acid, heat to boiling; then add 6 to 10 drops of a solution of copper sulphate (40 gr. copper sulph. to 2 oz. of pure glycerin), shake and boil again. To this fluid, which is of a deep-blue color, add the urine (which should have been filtered), a few drops at a time, heating between each series of drops until there is added about half as much urine as there is solution in the tube. There results a yellow precipitate—appearing quickly if there is a large amount of sugar present, and slowly if the amount is small.

Haines' Test.—Take pure copper sulphate (30 gr. to $\frac{1}{2}$ oz. of water), mix thoroughly, and add 5 oz. of liq. potass. In testing with this solution take about 1 dr. and gently boil in an ordinary test-tube. Next add from 6 to 8 drops (not more) of the suspected urine and again boil. If the sugar is present a copious yellow or yellowish-red precipitate is thrown down; if no such precipitate appears, sugar is absent.

Are epithelial cells normally present in the urine?

Yes. Their form and quantity may, however, indicate pathologic conditions of certain parts of the genito-urinary tract.

Describe the epithelial cells from the several parts of the urinary tract.

Cells from the uriniferous tubules are of the spheric granular form, with faint outlines, but with clearly defined nuclei. They may be single or agglutinated, as epithelial casts.

Cells from the loops of Henle are tessellated; from the straight tubes they are of the columnar variety.

Cells from the renal pelvis are tessellated epithelia, consisting of biconvex and caudate cells; the former being as long again as they are broad, the latter ovoid and club-shaped, ending in a fine point. The nuclei are well defined.

Cells from the ureters are tessellated epithelia, composed of polygon cells, with central and clearly defined nuclei.

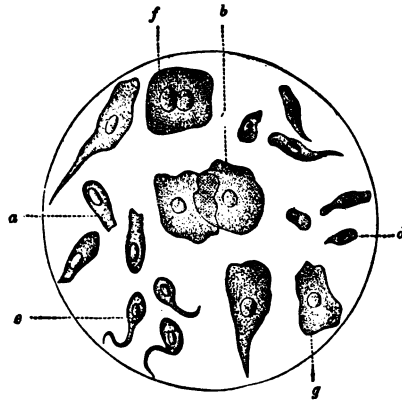


FIG. 5.—Epithelial cells: *a*, From male urethra; *b*, from vagina; *c*, from Cowper's glands; *d*, from Littre's glands; *e*, from female urethra; *f*, from bladder.

Cells from the upper layer of the bladder are flattened polygon cells; while those from the deeper layer of the bladder are more spheric in appearance.

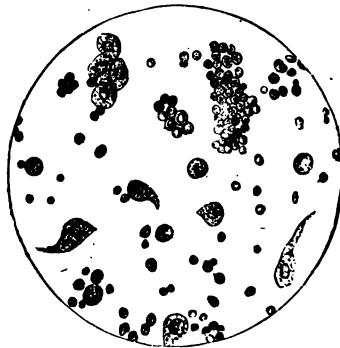


FIG. 6.—Renal epithelial cells and epithelial cells from renal pelvis.

What are the principal forms of tube casts found in the urine?

The most important form is the epithelial cast, composed

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of coherent epithelial cells of the tubes of Bellini. They are generally pale and transparent, and around them small round cells and nuclei may be recognized.



FIG. 7.—Waxy casts.

The hyaline casts are pale transparent cylinders of various sizes and configuration which show in delicate outlines. They are also termed mucous casts. A modification of the hyaline

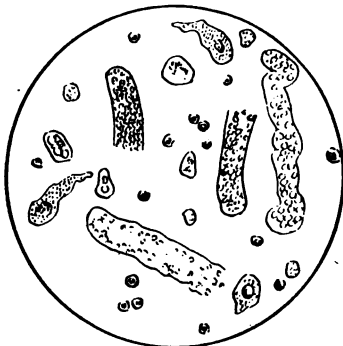


FIG. 8.—Granular casts with fatty globules; also blood and pus corpuscles and epithelial cells.

cast is called a waxy cast. It has a distinct outline, slightly yellowish color, and a waxy luster.

Granular casts, also termed fibrous casts, resemble the

hyaline casts, but have granular contents consisting of cells which have suffered granular change, which gives them a darker appearance. They may contain, also, oxalates, blood and pus corpuscles, fat-globules, and epithelial cells.

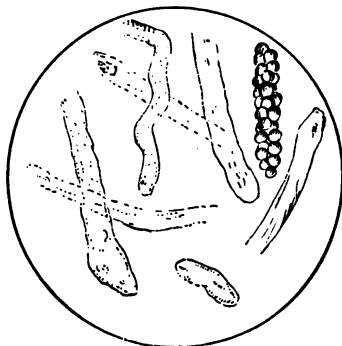


FIG. 9.—Hyaline casts, also one epithelial cast.

Have the different tube casts always positive value for differentiating the various forms of renal disease?

Not always, for in acute and chronic nephritis, as well as in amyloid degeneration, all the varieties of tube casts may be present. When one variety only appears it is of differential diagnostic value, as when the epithelial casts alone persist they point toward the existence of a desquamative nephritis.

GENITO-URINARY DISEASES AND SURGERY.

MALFORMATIONS.

Enumerate the malformations, injuries, and diseases of the urethra.

Hypospadias, epispadias, imperforate meatus, contusions, lacerations, foreign bodies, and tumors. The urethra may be absent or reduplicated, but such cases are of anatomic rather than surgical interest.

What is hypospadias? Mention its forms.

A deficiency of the urethra. The meatus may open at any point between the tip of the penis and the membranous portion. The situation which the urethra should occupy is a groove. If the glans only is involved it is called glandular hypospadias; if the urethra of the pendulous portion is also an open groove, it is called penile hypospadias; if it extends back as far as the perineal portion, it is called perineal hypospadias. Their frequency of occurrence is in the order named.

Give description and treatment of glandular hypospadias.

There is no frenum nor floor of the urethra in the region of the glans, and the prepuce hangs over the head in a loose flap. This condition may be relieved by enlarging the urethral opening with a knife and keeping it open by dilatation with sounds.

If the sulcus in the glans is deep enough to make a urethra, its edges may be denuded of epithelium and drawn together with sutures over a No. 8 American catheter, which should be kept in position five or six days. After the edges are sutured an external perineal urethrotomy should be done for urinary drainage. When union is firm the newly made urethra is united to the old by paring and suturing its end to the penile portion, using a catheter to facilitate accurate junction.

Another operation (Beck) is to free the urethra well back, bring it forward, and suture the end to an opening

punched through the glans. In this method there is no fistula formed.

Describe penile hypospadias. Give treatment.

The opening is near the penoscrotal junction, and the penis is often diminutive and held down by adhesions to the scrotum, which may almost surround it. The fibrous sheath is developed disproportionately to the corpora cavernosa, which are permanently curved downward.

The first step in any operation for this form of hypospadias is to free the penis from its adhesions to the scrotum by transverse incision through the sheath of the corpus cavernosum on its lower surface, avoiding the erectile tissue, so that its curvature can be corrected. The penis is then dressed straight on a splint. After recovery from this preliminary operation is complete, the cure of the urethral deformity should be undertaken. A most successful operation for this deformity is that of Rochet's modified Nové-Josserand operation. (See Keyes.)

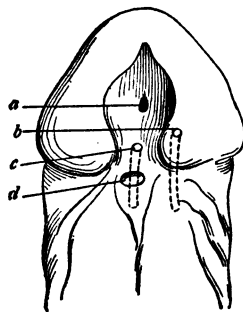


FIG. 10. — Glandular hypospadias: *a*, Depression at normal site of meatus; *b*, sinus half an inch deep, admitting No. 5 F., just under skin; *c*, sinus three-fourths of an inch deep, admitting No. 5 F., under skin above urethra; *d*, meatus (Curtis).

Give the description and treatment of perineal hypospadias.

The urethra opens in the perineum behind the scrotum, and the penis is infantile and buried between the testicles if they have descended. The urethral opening is in front of the cut-off muscle in this variety. The patient always has control of the bladder contents. If the testicles have not descended, this condition may be mistaken for hermaphroditism.

The treatment is that advanced for penoscrotal deformities.

What is epispadias? Mention its forms.

The roof of the urethra is partly or entirely absent, the opening being between the corpora cavernosa. The groove is on the dorsum of the penis. It may be glandular, penile, or complete.

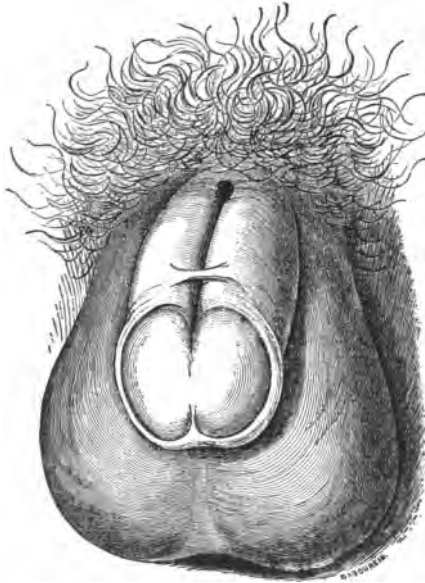


FIG. 11.—Complete epispadias.

Describe glandular epispadias.

Glandular epispadias consists of a total absence of the glans and prepuce. The operation for its correction corresponds to that for glandular hypospadias.

Describe penile epispadias.

There is no penile urethra. The dislocated meatus is on the dorsum of the penis, at its root. The operation for its correction corresponds to that for penile hypospadias.

Describe complete epispadias.

In complete epispadias there is no urethra at all, the groove along the upper surface of the organ extending into the neck of the bladder. A complicating extroversion of the bladder is common. In epispadias (unlike hypospadias), the muscles of the bladder neck being incomplete, there is necessarily incontinence of urine. Ordinarily it is better to sentence the patient to life-long use of the leg urinal than to essay operation. If exstrophy of the bladder demands correction, the best procedure is Maydl's operation, and consists of the implantation of the bladder wall immediately surrounding the mouth of the ureters into the colon, thus diverting the urine into the gut.

What is imperforate meatus?

A thin membrane closes the meatus. When the urine comes down to the end of the penis, it bulges the membrane; the urethra can be felt full and distended with urine, and the diapers are dry.

What is the treatment of imperforate meatus?

The membrane should be slit and a full-sized sound introduced a short distance, to insure complete dilatation.

THE URETHRA.

What conditions of the urethra may follow internal and external violence?

Contusions, incised wounds, and lacerations. Internal injuries are generally from surgical interference. The penile portion, on account of its extreme mobility, is only exceptionally injured by external violence. The deep urethra is frequently injured by falls and blows upon the perineum. A slight blow may produce serious injury without corresponding external evidence.

What is the treatment of injuries of the urethra?

Remove any foreign substance, check hemorrhage by forceps or pressure, with or without the aid of the sound. Usually a catheter should be retained for a day or two to prevent extravasation of urine. In extensive injury of the

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penile portion, perineal incision affords drainage for the urine. The perineal tube should remain *in situ* for six or eight days.

In injuries of the posterior urethra a catheter should be passed into the bladder and retained in position for at least one week, or perineal section performed. In all injuries of the canal, sounds should be passed subsequently, perhaps for several months, to prevent stricture.

What foreign bodies are sometimes found in the urethra ?

Slate pencils, sticks, and pieces of cotton have been found in the urethra. Children, led by curiosity, frequently introduce foreign substances. Such a body may work on into the bladder and become a center for the formation of stone. The common symptoms of foreign bodies in the urethra are hemorrhage and urethritis.

What is the treatment of foreign bodies in the urethra ?

If possible knead the object into the fossa navicularis, where it may be captured with forceps. If manipulation fails, try for it with urethral forceps through the endoscope. It is better to reach foreign bodies through a perineal section than to set up inflammation by prolonged taxis.

Name the tumors of the urethra.

Papillomata and mucous polyps (rare). The common symptom is a glairy discharge.

What is the treatment of urethral tumors ?

If they are papillomata remove them through the endoscope by forceps; if polyps, by scissors. If soft, a probe armed with a hard cotton swab may be passed below the growth and withdrawn, crushing the growth against the edge of the endoscope. The stump should be touched with a strong solution of silver nitrate. Cystic urethral glands should be incised through the endoscope and their bases cauterized.

THE PENIS.

Enumerate the diseases of the penis.

Cellulitis, cavernitis, varicose veins, tuberculosis, and tumors.

Describe cellulitis of the penis.

An inflammatory infiltration of the penis. It may arise from balanoposthitis, or chancroid complicated by phimosis, and may spread to the scrotum, thighs, or abdomen, or may involve the erectile bodies, when there is added danger from urinary retention, infiltration, and gangrene.

What is the treatment of cellulitis of the penis ?

Put the patient to bed, elevate the organ, and apply cold wet bichlorid compresses. Tension should be relieved by puncture, and if extravasation occurs, free openings are required.

What is cavernitis ?

Inflammation of the cavernous bodies. It may follow cellulitis, especially inflammation of the bulb of the corpus spongiosum. It may also succeed inflammation of the urethral follicles, or the infiltration of urine through some part of the canal.

What is the treatment of cavernitis ?

Induration in the erectile bodies should be freely opened, packed to check hemorrhage, and, later, irrigated often enough to keep the parts clear of obstruction.

Describe tuberculosis of the penis.

Tuberculosis may occur in the urethra, or as ulcers, resembling the chancroid on the glans; or it may appear as a necrotic mass which is readily mistaken for syphilitic gumma.

What is the treatment of tuberculosis of the penis ?

Constitutional and local. Tonic and hygienic regulations appropriate to tuberculosis elsewhere. The penis and inguinal glands may be removed in order to prevent a general tuberculosis from these foci.

Describe varicose veins of the penis.

An enlargement of the veins which when seen is characteristic.

What is the treatment of varicose veins of the penis?

Subcutaneous ligation. If the dorsal vein impairs erection, it should be ligated near the root of the penis.

What tumors appear upon the penis?

Sebaceous and dermoid cysts and malignant growths. The

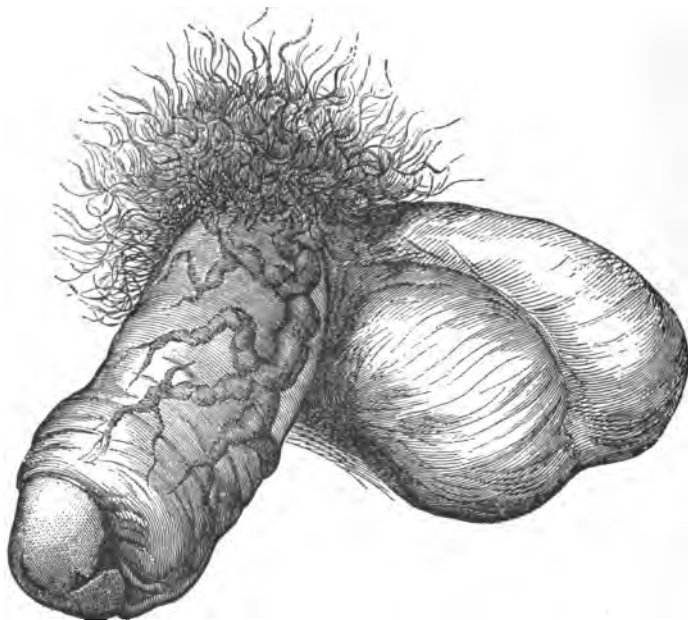


FIG. 12.—Varicose veins of penis (Demarquay).

former occur behind the corona or upon the integument. Dermoid cysts are oftenest seen along the raphe.

What is the treatment of tumors of the penis?

Removal through a free incision. If the resulting cavity is small, touch it with tincture of iodine; if large, pack it with gauze until it fills by granulation.

Describe malignant tumors of the penis.

Cancer usually develops from the glans or prepuce and may show a tense or moist surface or have the appearance of a cauliflower. A wart which persists or spreads, or an ulcer which develops a spreading induration which breaks down, should be suspected. There is rarely a marked cachexia. The inguinal glands may or may not be affected. The microscope may establish a positive diagnosis.

What is the treatment of malignant tumor of the penis?

Amputation.

Describe amputation of the free portion of the penis.

A No. 20 French sound is passed into the bladder, to indicate the position of the urethra. Apply an elastic bandage to the root of the penis, make an incision into the skin of the penis completely around the organ and at least $\frac{1}{4}$ of an inch from the disease. The natural elasticity of the skin will retract the flap. Expose and ligate the dorsal artery and vein of the penis. Divide the corpora cavernosa transversely at a level with the contracted skin flap. At a point about $\frac{1}{2}$ inch farther forward divide the urethra transversely. With catgut suture the ends of the corpora cavernosa; this stops bleeding. In the midline below make a short incision through the skin; make a corresponding cut through the urethra; suture the split urethra to the skin. The splitting and suturing prevents contraction.

Describe complete amputation of the penis.

Place the patient in the lithotomy position, split the scrotum completely along the raphe, and thoroughly expose the corpus spongiosum. Pass a sound through the urethra to the triangular ligament. Separate the corpus spongiosum from the corpora cavernosa. Remove the sound. Divide the corpus spongiosum and isolate the urethra as far back as the triangular ligament. Continue the scrotal incision through the skin around the root of the penis. Divide the suspensory ligament. Separate the crura from the pubic bones. The only vessels requiring ligation are those of the crura. This completes the amputation. Make a short split in the urethral

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stump. Suture the edges of the split urethra to the posterior portion of the scrotal wound. Suture the skin wound after providing for drainage.

Should the inguinal glands be removed ?

Yes, if the malignant growth demands ablation of the penis.

Describe the operation for the removal of the inguinal glands.

An incision is made along Poupart's ligament. To remove the glands above this line, cut inward to the fascia of the external oblique muscle, and then, with a blunt instrument, dissect fat and glands, beginning at the outer angle of the wound. In removing the glands below the ligament, begin also at the outer angle. The saphenous vein, which is near the surface, is to be avoided ; also the vessels and nerves of Scarpa's triangle, below.

THE SCROTUM.

Describe the scrotum.

The scrotum is a bilateral pouch with a raphe in the median line. The left is the larger side. The scrotum contracts as a whole when affected by cold or emotion and during the sexual act. It becomes flaccid under the influences of heat and body relaxation and in the aged. The contraction of the scrotum which throws the integument into rugæ is caused by the dartos, or contractile tissue, which underlies the skin. This contractile quality should be remembered when dealing with wounds of the scrotum.

Name the diseases and injuries common to the scrotum.

Edema, urinary infiltration, emphysema, gangrene, tumors, redundancy, varix, lacerations, contusions, and punctured wounds.

Describe edema of the scrotum.

Dropsy of the scrotum is usually a manifestation of renal or cardiac disease, or of malignant or tubercular affections.

The sac becomes distended, smooth, pallid, cold, and often so tense that the surface shines. At first much of the effusion may be pressed out, but if the affection continues long, inflammatory changes occur and the skin becomes infiltrated and hard.

What is the treatment of edema of the scrotum ?

The constitutional conditions present should always be treated. Support the scrotum by a flannel bandage giving uniform pressure. Blebs should be opened, excoriations treated with drying powders—such as pulverized acetanilid, subgallate of bismuth, calomel, or boracic acid. Punctures and scarifications are not usually recommended, as they encourage ulceration. If abscess forms it must be freely incised, and the cavity packed and kept surgically clean.

Describe extravasation of urine into the scrotum.

Urine burrowing into the scrotum produces tumefaction, hardness of its walls, and, if unchecked, inflammation, abscess, and gangrene.

What is the treatment of urinary extravasation into the scrotum ?

Establish free drainage by incision, and force healing from the bottom by packing the wound.

What is emphysema of the scrotum ?

The presence of gas in its tissues. It may enter through a local wound, come from the intestine or air passages, or may result from bacterial action.

What is the treatment of emphysema of the scrotum ?

When the gas is generated within the scrotum an incision, drainage, and surgical cleanliness are sufficient ; when introduced from without, the cause is treated.

What is gangrene of the scrotum ?

Death of the parts. It may follow edema, injury, or extravasation of urine ; it may also occur spontaneously in

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the debilitated. The scrotum becomes red and tumid, the color within twenty-four to forty-eight hours turning black to a line of demarcation. The gangrenous area may cover part of one or both testicles. The dead tissue slowly sloughs, exposing the underlying testicles. Granulation tissue usually finally covers them.

What is the treatment of gangrenous scrotum ?

Maintain the general health by tonics and nutritious food. Opium, in sufficient quantity to quell irritability, is indicated. Wait for the line of demarcation. Clean away any slough easily detached. Stimulate the parts by warm applications, and establish a general antiseptic local treatment.

What tumors may develop in the scrotum ?

Sebaceous and dermoid cysts, and, infrequently, epithelial growths.

What is the treatment of tumors of the scrotum ?

Benign tumors should be shelled out through a small incision, and the wound cavity packed with surgical gauze or closed with gut sutures. Malignant growths should be removed by incision through surrounding tissue which is certainly healthy ; the testicle, if it is adherent to the scrotum, should be taken also.

What is redundant scrotum ?

An elongated and relaxed condition of the sac.

What is the treatment of redundant scrotum ?

If varix is present its correction is frequently followed by cure of the redundancy.

To remove superfluous scrotal tissue, clamp off the excess below the testicles and cut along the outside edge of the clamp. Release the clamp and check all hemorrhage. Close the wound over the testicles with sutures. Drainage is sometimes necessary.

What are the common injuries of the scrotum ?

Contusions (pinches), lacerations, and punctured wounds.

What is the treatment of injuries of the scrotum ?

In all lacerations and contusions of the scrotum the parts should be supported by a triangular bandage, and cooling applications applied. The wounds should be thoroughly cleansed. Sloughs should be given time to show their lines of demarcation.

What is hydrocele ?

An accumulation of fluid in the tunica vaginalis testis.

The characteristic form of hydrocele is that of an egg with its tip directed upward. Its transparency (which is always present, except in cases where there is inflammatory thickening of the walls) is diagnostic. To examine, darken the room and look through a paper tube held close to the scrotum. A candle or small brilliant light held to the scrotum, on the other side, furnishes illumination. The testicle appears as a dark spot.

Differentiate between hydrocele and hernia.

In hydrocele the tumor begins below and extends upward ; in hernia the development is from above downward.

The growth in hydrocele (unless traumatic) is always slow, while hernia may appear suddenly. Hydrocele is translucent ; hernia opaque. In hydrocele, percussion yields a flat note and causes a fluctuation wave ; in hernia the percussion sound is more or less resonant and yields no wave. In hydrocele the testicle cannot be outlined, while in hernia it is usually felt below the tumor. To determine that a hydrocele is simple, evacuate the sac and manipulate.

What is the treatment of hydrocele ?

Grasp the tumor from behind so as to steady it, puncture the skin just below the middle of the tumor, and thrust the point of the trocar through the tunica vaginalis reflexa. The obturator is then withdrawn and the fluid drained away. The patient should stand during the operation. This procedure may be repeated many times. Frequently a second or third tapping is followed by a cure. Another method, now rarely used, is to inject through the tube of the trochar, after complete evacuation of the tumor, a few drops of compound

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tincture of iodine and carbolie acid crystals, with enough water to make a solution. Inflammatory reaction is sometimes followed by obliteration of the cavity by adhesion of its walls.



FIG. 13.—Hydrocele (Keen and White).

What is the radical operation for hydrocele ?

Lay open the sac, grasp the tunica vaginalis reflexa and suture its edges to the edges of the skin incision. Drain with tube or gauze. Apply dressings.

Bergmann's operation is done as follows : Through the skin make an incision extending from near the upper to near the lower end of the hydrocele. Expose the sac, and by blunt and sharp dissection separate it from its coverings until its connections with the testicle are reached. Open the sac and trim it off close to the testicle, check hemorrhage, close the wound with or without drainage, apply dressings, and support the scrotum.

Jaboulay's operation is done as follows : Incise the hydrocele. Bring the testicle out through the wound. Ligate and divide the gubernaculum testis. Fold the two sides of the divided sac behind the testicle and fix them there by a few sutures, one of which must intersect the superficial tissues of the cord. Reduce the testicle. Close scrotal wound by a few sutures,

What is hematocele of the scrotum ?

A sudden extravasation of blood into the cavity of the tunica vaginalis.

What is the treatment of hematocele of the scrotum ?

If small, promote absorption ; otherwise, incise, turn out the clot, and treat surgically.

THE TESTICLES.

Describe the testicles.

The testicles are developed in the abdominal cavity of the fetus. About the fifth month of fetal life they begin to descend and pass through the inguinal canal into the scrotum, arriving there about a month after birth. Each, suspended by its spermatic cord, lies loosely in the scrotum, surrounded by connective tissue. The left is usually slightly longer than the right and hangs lower. The average weight in the adult is 6 drams. During venereal excitement the testicles are turgescient, firm, and elastic ; otherwise, soft and yielding.

The proper coverings of the testicle are two—the tunica vaginalis and the tunica albuginea. The former is the serous covering of the testis. It is a closed sac investing all the testicle, except where the epididymis is attached behind, and the remains of the gubernaculum below. It dips down posteriorly between the epididymis and the testicle, forming a cul-de-sac, at the bottom of which the sac on the two sides comes together. On the outer side the tunica vaginalis covers and closely invests the epididymis. The reflected portion forms the closed sac and extends up the cord some distance. The cavity of the tunica vaginalis supplies enough fluid to lubricate the testicles, so that they slip about easily in the sac. The tunica albuginea is the proper investing membrane of the secreting portion of the testicle. It is a dense, white fibrous tissue, slightly extensible. The epididymis caps the testicle proper and skirts its posterior border. It begins above where the vasa efferentia issue through the tunica albuginea. These canals immediately dilate and collect in convoluted cones, forming the head or globus major, which lies on the top of the testicle. The convoluted cones all empty into one canal, the canal of the epididymis. The body is separated

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from the testicle by the cul-de-sac of the tunica vaginalis. Below, the canal of the epididymis convolutes and forms the tail of the epididymis or globus minor. The tail is united to the testicle by connective tissue, and from that point the canal becomes dense and is known as the vas deferens.

Classify and describe the anomalies of the testicle.

Anomalies in development.	{	Number.	{	Excess	Polyorchism.
			{	Deficient {	. . . Absence—Anorchism.
					. . . Fusion—Synorchism.
	{	Size.	{	In excess	Hypertrophy.
			{	Deficient	Atrophy.
Anomalies in migration.	{	Undescended	{	Incomplete migration . .	Retention.
			{	Abnormal migration . . .	Ectopia.
	{	Descended			Inversion.

—(MONOD AND TERRILLON.)

What is polyorchism?

A term indicating that more than two testicles are present. It should be distinguished from a pedunculated tumor, an encysted hydrocele, or an omental hernia.

What is anorchism?

The absence of one or both testicles. The epididymis in these cases is usually absent. The vas deferens and seminal duct may be present or absent, and rarely the testicle may exist without its attachments.

What is synorchism?

Fusion of the testicles. Mentioned as a curiosity.

What is cryptorchism?

Absence of one or both testicles from the scrotum, but existent elsewhere in the body. The diagnosis between cryptorchism and anorchism may depend upon the result of an exploratory operation to find a testicle which has not descended.

What is monorchism?

A term meaning the presence of but one testicle.

What is ectopic testicle ?

One that has lodged somewhere out of its normal situation, as at the saphenous opening, at the base of the penis, or in the perineal region.

What is retained testicle ? Classify retained testicle.

A testicle checked in its descent. It may lodge in the abdomen above the internal ring, below the ring, at the ring, or under the pubes. Retained testicle is classified as (1) Abdominal retention; (2) inguinal retention; (a) internal inguinal retention; (b) interstitial inguinal retention; (c) external inguinal retention; (3) puboscrotal retention; (4) retained testicle, its epididymis and vas descended normally into scrotum.

What is inversion of the testicle ?

A testicle turned wrong side up, or rotated, its long axis horizontal or abnormally attached to the epididymis, or above and in front of, instead of below and behind, the tunica vaginalis.

What is the treatment of inguinal retention of the testicle ?

Reduction or operation before the tenth year. Reduction is accomplished by continuous pressure from a truss or its equivalent.

Operation (Broca) is done as follows: Open the inguinal canal; free and tie off the hernial sac if present; then divide the cremaster muscle and other restricting bands; free the cord thoroughly from surrounding fascia and anchor the testicle as low as possible in the scrotum. Close the inguinal canal as for radical cure for hernia.

Enumerate the injuries and diseases of the testicle.

Luxations, contusions and punctures, gangrene, hypertrophy, atrophy, neuralgia, tumors, tuberculosis, epididymitis, orchitis, hydrocele, spermatocele, pyocele, and hematocele.

What is luxation of the testicle ?

Dislocation of the testicle. It is generally due to muscular contraction and is seldom seen. The testicle may be found in the inguinal canal, upon the pubes, or on the thighs.

What is the treatment of luxation of the testicle ?

Replace and retain it in its proper position by operation.

Describe contusions and punctures of the testicle.

If the injury be slight, tenderness of the organ and ecchymosis of the scrotum may be the only evidences ; if severe, there is hematocele or orchitis, or both. Either may result in atrophy of the organ. If the puncture is small, there may be little or no hemorrhage ; if deep and large, there may be hematocele, swelling of the organ and protrusion of its substance through the wound.

What is the treatment of contusions and punctures of the testicle ?

For contusions, rest in bed with the parts slung upon the pubes, and cold compresses.

For punctured wounds the treatment is practically the same. If the glandular substance protrudes, the scrotum should be opened, the testicle exposed and cleansed, and the hernia, if possible, reduced. If irreducible, snip the granular substance off on a level with the testicle. Even if destruction is great the treatment should be conservative.

When does hypertrophy of the testicle occur ?

Generally in compensation for the absence or crippled condition of the other. No treatment.

When does atrophy of the testicle occur ?

As the result of orchitis, or from interference with its blood supply. The treatment is to remove the cause. This is possible in very few cases.

What is irritability of the testicle ?

A superlative sensitiveness of part or all of the gland. The organ may be either slightly tumid or flabby, while the dartos tissue of the scrotum is relaxed.

What is the treatment of irritable testicle ?

Soothing lotions applied with the scrotum elevated, proper sexual hygiene, and large doses of bromid of potassium.

Describe neuralgia of the testicle.

An excessive irritability of the organ due nearly always to disease of the urethra. It may be terrible in intensity and become paroxysmal. The pain increases upon exercise, and may be constant, acute and darting, or heavy and dragging. The cremaster contracts spasmodically during the paroxysms. But one testicle usually is involved, and there is no pathologic or febrile reaction. This trouble may occur without assignable cause, or be the result of sexual excess, long-continued erection, or nervous depression.

What is the treatment of neuralgia of the testicle ?

Cure the disease of the urethra, upon which it depends. Judicious physical exercise, diet, fresh air, and regular habits are important. Sounds and instillations of silver have their use. A daily rectal douche, hot or cold, is often beneficial. Ethyl chlorid spray against the front of the scrotum frequently gives relief.

Name the malignant growths of the testicle.

Carcinoma and sarcoma are the commonest. The age at which malignancy appears is from fifteen to forty-five. Sarcoma is rarely found in young children. The disease begins in the connective tissue, between the tubes, or in the glandular epithelium of the tubes, and, increasing in size, soon involves the entire tissue. The tumor is smooth and uniform, until the tunica albuginea breaks down, after which the growth increases rapidly, feels irregular and nodular, with soft areas. The scrotum sloughs, allowing enormous overgrowth, and the adjacent glands become involved. The lower extremities swell and the general health rapidly fails. The treatment is surgical.

Describe the operation of removal of the testicle.

Make a longitudinal cut in the scrotum, drag out the testicle (if adherent to the scrotum, liberate it and secure bleeding-points), make the cord tense, tie, cut it, allowing the stump to retract. Suture the scrotum; leave drainage.

How does tuberculosis of the testicle occur?

Associated with diffuse miliary tuberculosis; or one or more tubercular nodules may appear. The latter are usually seen in the epididymis and involve the testicle secondarily. Any hard growth in the testicle, and especially when others are found elsewhere in the genito-urinary tract, appearing without apparent cause and without symptoms, should be considered tubercular. Tubercular nodules may remain latent in the epididymis for months, but ultimately there are swelling and pain as preliminaries to abscess. Before the formation of pus one or more very dense nodules become cheesy. The skin becomes adherent over a circumscribed tumor with hard walls and a center of softening.

What is the treatment of tuberculosis of the testicle?

Castration and high removal of cord.

Describe epididymitis.

Epididymitis is usually a sequel of gonorrhea appearing about the third week of the disease. It may occur as early as three days after acute infection or not until a gleet has run a course of months. The inflammation is most acute at one or the other heads of the organ, usually the globus minor. The process may be sharply limited or it may also involve the testicle. When both organs are involved it is called epididymo-orchitis. Some individuals seem so predisposed that every attack of gonorrhea means epididymitis. This complication is, however, usually avoided if the patient wears a suspensory bandage, abstains from overexertion, and avoids sexual excitement and alcoholic indulgence during all stages of his gonorrhea.

Epididymitis may be acute and is prone to run into the chronic form, or may be subacute from the start. It usually terminates in resolution, rarely abscess. One attack predisposes to another. It is often double, but the two testicles are rarely simultaneously affected, the inflammation of one usually preceding that of the other by a number of days or even weeks, after which the disease sometimes returns to the testicle first involved. The chief cause of epididymitis is gonorrheal infection travelling along the urethra up the ejaculatory ducts and along the vas deferens to the globus minor. In

acute epididymitis the tunica vaginalis is involved in over one-third of the cases. Inflammatory deposit may occlude the spermatic canal, and if this occurs in both canals the patient is rendered sterile without atrophy of the organs.

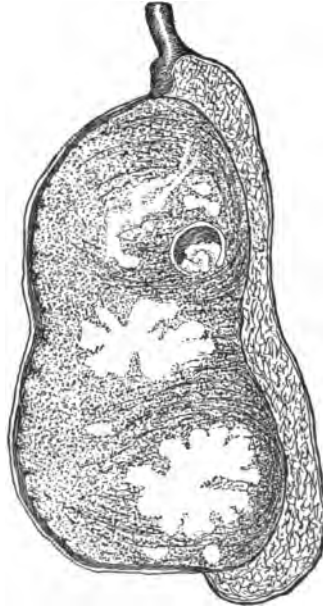


FIG. 14.—Primary chronic tuberculosis of the testicle: The testicle is much enlarged and contains a number of irregularly outlined caseous foci; the epididymis is intact, but is elongated, flattened, and stretched over the enlarged testicle (Senn).

What are the symptoms of acute epididymitis ?

At first a vague feeling of uneasiness is felt in the testicle and along the cord. The pain increases and the testicle swells rapidly, the scrotal tissue becomes edematous and purplish. The patient walks in a stooping posture. The inflamed mass rapidly reaches the size of a man's fist and the cord becomes swollen and painful. Occasionally the cord may become partly strangulated in the inguinal canal. The

pain is of a dragging, sickening character, causing faintness. As inflammation proceeds the urethral discharge ceases, only to begin again upon the subsidence of the epididymitis. The tunica vaginalis is usually involved, and an effusion takes place in the sac forming a fluctuating tumor, which is often mistaken for the testicle. Careful manipulation will discover the latter behind the swelling.

What is the treatment of epididymitis?

Prophylactic. The patient should avoid violent exercise

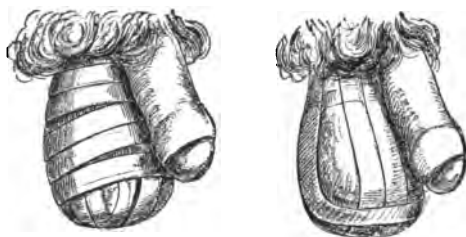


FIG. 15.—Strapping of the testicle (Smith).

during the existence of urethral disease and wear a suspensory bandage. At the first complaint of a dragging, uneasy sensation in the groin or testicle the patient should be put to bed, the scrotum elevated and painted with a 50 per cent. guaiacol glycerin solution. If this is done early the inflammation may subside. The scrotum should be elevated with a handkerchief folded in a triangle, the base of which is placed under the scrotum, the ends brought up and tied to a waistband. The remaining end is brought forward and secured to the waistband so as to hold the dressings in place. A popular local application is the tobacco poultice. Boil fine-cut tobacco, and mix enough ground flaxseed to make a poultice, which should be applied and changed often enough to keep the parts constantly hot for twenty-four hours.

Pressure from the complicating hydrocele may be relieved by puncture and drainage. After the very acute symptoms

have subsided, say the third day, the testicle should be strapped either with surgeon's adhesive strips or, better, with a flannel bandage 1 inch wide. The first turn is made over the top of the isolated testicle, then circular turns over its rotundity, and finally, turns are made as for bandaging the stump of a leg, making uniform pressure. The patient is able to walk after the bandage is applied.

What is orchitis ?

Inflammation of the body of the testicle. A frequent complication of epididymitis which may also be due to traumatism or inflammation of the deep urethra.

Traumatic orchitis is usually associated with epididymitis, the symptoms of the latter predominating. Chronic orchitis may arise from some diathesis, as rheumatism, or from hyperesthesia of the genitals, and is usually accompanied with neuralgia. Orchitis may be a sequel of mumps or other febrile diseases.

What are the symptoms of orchitis ?

Its onset is gradual, the pain is of a dull character and radiates from the testicle to the loins and buttocks. The testicle is so sensitive that manipulation may cause syncope. It is little altered in size or contour, but is drawn up and compressed by the cremaster muscle. Its natural elasticity is entirely wanting. Gangrene may supervene suddenly, with a simultaneous cessation of pain, or the exudate may so press upon the seminiferous tubes that suppuration results. There may be chill, nausea, vomiting, hiccough, and constipation. Bilateral orchitis usually results in both sterility and impotence from atrophy of the secreting structure of the testicle.

What is the treatment of orchitis ?

Put the patient to bed and elevate the scrotum. The use of jaborandi internally is recommended, also narcotics, if the pain is severe. Applications of ice-cold 2 per cent. solutions of acetate of aluminum will suffice in the majority of cases. In severe cases or where pus formation is discovered or gangrene threatens, the tunica vaginalis should be punctured as follows: With a sharp tenotomy knife incise the skin of the scrotum and then the tense capsule of the testicle. Several

punctures should be made at different points on the surface of the testicle. If fluctuation becomes apparent, evacuate the pus. If hernia testis occurs, it may be reduced and the capsule of the testicle sutured. If it is irreducible or fungoid, it should be tied off, care being exercised not to draw out the tubules. In cases of gangrene, chronic suppuration, or a large fungoid growth, castration is indicated.

What is spermatocele ?

An epididymal cyst containing spermatozoa. The small cysts develop about the epididymis; the larger ones within the epididymis. The treatment for the larger variety consists in aspiration and injection of carbolic acid. Small cysts rarely require interference.

What is pyocele ?

An encysted collection of pus, usually tubercular, of the epididymis; but it may originate from the testicle or cord.

What is the treatment of pyocele ?

Evacuate the sac and pack the cavity with gauze.

What is hematocele of the testicle ?

In injury of these parts, if the coverings of the testicle and spermatic cord are affected, the blood gravitates to the net-like tissue of the tunica vaginalis communis and forms a diffuse soft tumor in the scrotum or along the course of the spermatic cord. If the testicle itself is injured, an effusion of blood may occur within the tunica albuginea and form a hematoma testis. In contusion of the testicle the pain is extreme, often being so severe that the patient faints or is profoundly shocked. Contusion of the scrotum, on the contrary, is not so painful, and the extravasation of blood often assumes enormous proportions.

What is the treatment of hematocele of the testicle ?

Put the patient to bed, elevate the parts, apply lead-water lotions, or a solution of aluminum acetate. Pressure bandages are contra-indicated. If abscess formation is feared or gangrene threatens, free incisions are indicated. Abscess formation or gangrene are ushered in by a chill, high fever, and violent pain.

THE SPERMATIC CORD.

Describe the spermatic cord.

The cord is made up of the vas deferens, arteries and veins, lymphatics and nerves in a sheath of connective tissue, which is covered by the tunica vaginalis communis. Surrounding this is the cremaster muscle. The arteries are the spermatic branch of the aorta, the deferential of the superior vesical and the cremaster, which comes from the epigastric. The veins from the testicle and epididymis form the pampiniform plexus, which constitutes the bulk of the cord. The veins unite to form a trunk which has valves. Blood from the left testicle passes into the renal vein; that of the right, into the ascending cava. The nerves are the spermatic plexus from the sympathetic, joined by filaments from the pelvic plexus, which accompany the artery of the vas deferens.

The cremaster muscle has the double office of supporting the testicle and of compressing it during the sexual orgasm. That it is to some extent controlled by the will is shown by the ability of many men to draw the testicles to the top of the scrotum.

What is the vas deferens?

The excretory duct of the testicle. It runs upward from the tail of the epididymis to form one of the parts of the spermatic cord. It lies in the inner and posterior aspect of the cord and can be distinguished by its greater density and the ease with which it can be isolated from the surrounding tissues. After passing through the inguinal ring and canal the vas deferens curves obliquely downward and backward over the base of the bladder, crosses behind the ureter and runs to the inner side of that duct, separated from it by the seminal vesicle. At this point it becomes sacculated, then narrows to its original dimensions, and is joined by the duct of the seminal vesicle to form the common ejaculatory duct, which pierces the prostate and opens into the posterior urethra, just in front of and to one side of the veru montanum.

What are the accidents and diseases common to the spermatic cord?

Wounds, torsion, tumors, hydrocele, and varicocele.

Give description and treatment of wounds of the cord.

Wounds of the cord are usually inflicted during surgical operations. The profuse hemorrhage, which is likely to occur, is easily controlled by ligature. If the vas is cut, it should be united by anastomosis to avoid occlusion of the duct.

Describe torsion of the cord.

The cord becomes twisted upon itself, usually one or more turns constricting its lumen. The symptoms simulate those of strangulated hernia. The scrotum and groin become tumid and tender almost at once. There are vomiting, chills, and fever.

What is the treatment of torsion of the cord?

If manipulation fails, cut down upon it and correct the twist; if recurrent, anchor the testicle by a stitch to the dartos.

What tumors occur in the cord? Give treatment.

The several forms of lipoma. The treatment is either to manipulate them into the canal or to remove them by incision.

What is hydrocele of the cord?

Hydrocele of the cord occurs if a portion of the vaginal process remains patent instead of becoming obliterated, and a serous effusion takes place into its cavity. If the vaginal process be closed only above at the internal ring and below at the upper part of the testicle, the tumor will extend along the cord as far as the internal ring; in other cases when the vaginal process is partly obliterated, smaller cysts are formed along the cord. Hydrocele of the cord is characterized by the fact that there is formed a tumor, limited above by the internal abdominal ring, and below, by the testicle. It is not reducible, undergoes no alteration when the patient changes position, is not forced out by coughing. Fluctuation cannot always be detected because the sac may be tense and distended, or its walls too thick for the fluid wave to be transmitted. Occasionally hydrocele of the cord descends behind the testicle and in this case may be mistaken for ordinary hydrocele.

What is the treatment of hydrocele of the cord ?

Multiple puncture and the injection of iodin to produce inflammatory adhesions of its walls will cure the ordinary case.

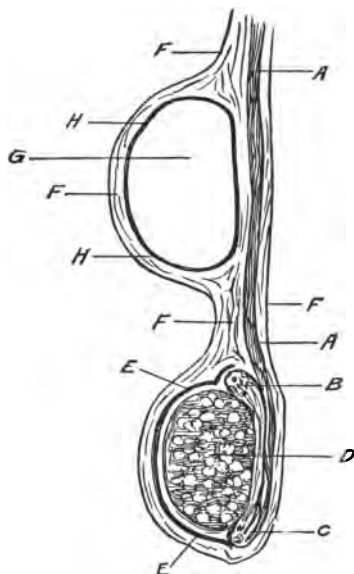


FIG. 16.—Hydrocele funiculi spermatici (cystic hydrocele): *A, A*, Spermatic cord; *B*, globus major; *C*, globus minor; *D*, testis; *E, E*, tunica vaginalis propria; *F, F*, external skin and subcutaneous tissue; *G*, hydrocele of the cord; *H, H*, wall of the hydrocele—the separate layers of the processus vaginalis (after Lesser).

What is varicocele of the cord ?

Varicocele is made up of the distended veins of the cord. It may be symptomatic from some intra-abdominal pressure or spontaneous from enlargement of the pampiniform plexus. Ninety per cent. of varicoceles are on the left side. Varicocele develops slowly, and neither its age nor size has any constant relation to the amount of distress it causes. The pain, which is sometimes of neuralgic character, is felt in the groin, the lumbar region, and thighs. In pronounced cases the

affected testicle hangs low ; the scrotum is flaccid and feels as if it contained a bunch of earth-worms. If the patient lies down the varicocele is reduced readily, but pressure at the canal does not retain it.

What is the treatment of varicocele ?

Palliative and surgical. The former consists in wearing a

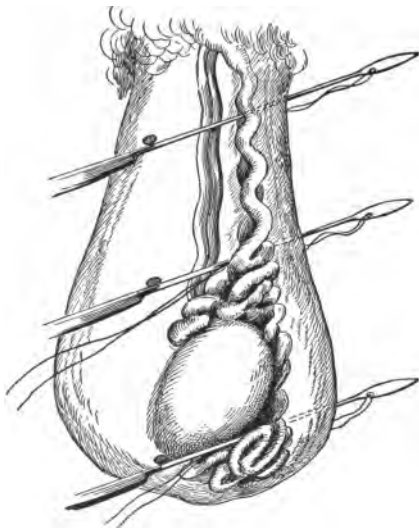


FIG. 17.—Diagram showing operation for varicocele (Keyes).

suspensory bandage ; the latter in subcutaneous ligation ; open operation, low or high.

Describe subcutaneous ligation.

Grasp the scrotum with the thumb and forefinger of one hand and with the thumb and finger of the other separate the vas deferens from the plexus of veins. With the patient standing, thrust a needle, armed with catgut, through the space between the vas and the plexus of veins. The needle has a sliding rod, by means of which the eye can be opened and the catgut liberated. When the needle emerges from the posterior wall, slide the bar which opens the eye and

unthread the needle. Pull out one strand. Now withdraw the needle from the posterior wall of the scrotum beyond the vas and plexus of veins, but not through the anterior scrotal wall. Turn the point of the needle slightly, so as to pass on the outside of the plexus, and push it through the puncture in the posterior wall of the scrotum. Then thread the needle and withdraw entirely. There results a loop of the plexus of veins, the strands hanging out of the anterior puncture. Tie tight, forcing the knot down upon the plexus. Cut short and allow the knot to retract within the scrotal sac. Dress dry. (Keyes.)

What is the low operation for varicocele?

Incise the scrotum and expose the veins. Separate the vas and artery from the plexus. A strong catgut strand, by means of an aneurism needle, is passed so as not to include the vas and artery around the plexus of veins. Tie tightly and cut short. Suture the scrotum and dress dry. Drainage may be left.

Describe the high operation for varicocele.

Pinch up the skin at right angles to a line corresponding with the long axis of the canal over and a little below the external ring. Transfix with a finger knife and cut outward. Expose the veins in their sheath in the bottom of the wound. Cut the sheath. The veins constituting the anterior portion of the cord then become visible. Grasp this group of veins and separate them, selecting one for preservation to return blood from the testicle. The veins to be ligated should be separated from the vas and the artery, which (with the sound vein selected) are dropped out of harm's way. Draw up the bunch of veins so as to include the mass occupying the scrotum. Pass a chromicized catgut ligature around the lower portion to be tied off and secure it firmly. Now strip the blood from the veins and pass another ligature around them, about $1\frac{1}{2}$ inches above the first, and tie securely. Cut the intervening mass of veins and one strand of each ligature. With the remaining strands tie the stumps together. After tying the stumps together, cut one of the remaining strands of the last knot, thread the remaining strand and anchor the

stumps by several stitches through the external pillar of the ring. The deep and supercial fascia are now united with a continuous suture, and the external wound closed with a subcutaneous stitch. Tuck in a few strands of silk-worm gut in the lower angle of the wound for drainage. The drain may be removed in twenty-four hours. The inflammatory thickening which appears at the point of contact of the stumps and external pillar will gradually become absorbed.

The patient should remain in bed for about seven days after this operation.

THE SEMINAL VESICLES.

Describe the seminal vesicles.

Two lobulated pouches attached to the base of the bladder and resting on the rectum. They are about 2 inches long, $\frac{3}{4}$ of an inch wide, and 1 inch from before backward. They serve as reservoirs for the semen and secrete a fluid giving it additional bulk. Each sac is somewhat pyramidal in form, the broad end directed backward and the narrow end forward toward the prostate. Each vesicle lies to the outer side of its vas, its apex buried in the prostate, where it joins the vas at an acute angle to form the ejaculatory duct. Each duct is about $\frac{3}{4}$ of an inch long. They commence at the base of the prostate and run forward between the middle and lateral lobes and alongside of the sinus pocularis to terminate by a separate orifice close to or just within the margin of the sinus.

The function of the vesicles is to store and dilute the secretion of the testicles and to expel their contents into the prostatic sinus just before ejaculation. The diseases to which they are subject are vesiculitis and tuberculosis.

Describe acute seminal vesiculitis.

This disease frequently occurs simultaneously with gonorrheal epididymitis, the inflammation passing from the posterior urethra along the common ejaculatory duct. When gonococccic infection occurs, the walls of the vesicle secrete pus, which soon distends its cavity. There is dull or throbbing pain or a sensation of weight in the region of the

perineum, with increased urination and more or less tenesmus. The symptoms of acute seminal vesiculitis are similar to those of acute posterior urethritis. The pain is increased when the bladder is distended. To differentiate acute seminal vesiculitis from posterior urethritis, rectal examination is necessary. Digital exploration will show the vesicle to be enlarged in all its dimensions and acutely tender. As in posterior urethritis and epididymitis, the urethral discharge may disappear temporarily. The discharge from the seminal vesicles is often colored a chocolate hue by the mixture of blood. When the vesicles become distended with pus, they discharge into the posterior urethra, the pus flowing back into the bladder, so that in seminal vesiculitis both blood and pus are mixed with the urine.

If the inflammation is severe abscess may form.

Describe abscess of the seminal vesicles.

When abscess forms, the finger in the rectum detects a large boggy and painful swelling at the base of the bladder and behind the outer edge of the prostate. In neglected cases the abscess wall may burst and the pus burrow into the peritoneum or riddle the pelvic floor. Usually, however, the abscess opens into the rectum or bladder.

What is the treatment of abscess of the seminal vesicle ?

The cavity should be opened by perineal incision past the margin of the prostate.

If the abscess has pointed forward a trochar or knife laid along the finger may be driven into it from the rectum.

What is the treatment of acute seminal vesiculitis ?

Rest in bed, free catharsis, and low diet. Hot sitz baths and copious irrigations of the bowel with hot water give comfort. If there is severe posterior urethritis belladonna and opium suppositories are called for. Santal oil in 10-drop doses three times daily is excellent.

What is chronic seminal vesiculitis ?

An extension of a chronic inflammation of the posterior

urethra which has involved the ejaculatory ducts and finally the vesicles. It may, however, have its origin in an acute attack of vesiculitis. Vesiculitis may occur in two forms, uncomplicated inflammation and inflammation with perivesiculitis. In the first form the vesicle is enlarged and its walls thinned, stiffened, and hardened. The cavity is filled with a mucopurulent secretion which may be tinged with blood. In the second form there is a small round-celled infiltration thrown out in the early stages, surrounding and imbedding the vesicle, which later becomes organized, forming adhesions which bind the vesicles to the base of the bladder.

What are the symptoms of chronic seminal vesiculitis ?

Frequent urination, spasm of the cut-off muscle, and a glairy discharge. The patient becomes hypochondriacal. There is irritability of the genital tract as shown by nocturnal emissions, premature ejaculations, neuralgic pains, resembling chronic prostatitis. The pain may be reflected to the testicles, back, loins, and hips.

How may the vesicles be examined ?

The index finger is introduced into the rectum and counter-pressure made over the bladder, while the patient bends over a chair. The healthy vesicle is soft, but if vesiculitis is present it is tumid and acutely tender, and if perivesiculitis exists it feels indurated.

To evacuate the vesicles force the finger to the highest point and withdraw pressing, in a side-to-side motion. The discharge will show at the meatus. Where gonococcic or tubercular infection is suspected a smear from the expressed secretion, properly stained and examined microscopically, is of importance in making a correct diagnosis.

What is the treatment of chronic seminal vesiculitis ?

The vesicles should be emptied by stripping every five days. Massage causes absorption of the inflammatory thickening and the vesicles regain their tone. Treatment must frequently be continued for months.

Describe tubercular vesiculitis.

It is usually secondary to tuberculosis elsewhere in the tract. It may be an extension from the posterior urethra or prostate, or from the epididymis. The primary form soon spreads to adjacent organs, and breaking down causes rectal or perineal fistulæ.

The diagnosis depends upon finding hard nodules in or upon the walls of the vesicles and bacilli in the expressed fluid. The canal anterior to the seminal ducts should be cleansed with a boracic acid retroinjection before the vesicles are stripped.

What is the treatment of tuberculosis of the seminal vesicles?

The general treatment is that laid down for tuberculosis elsewhere in the body. Regarding operative intervention, the principle that a tubercular focus should be removed whenever it is possible to destroy it, should be adhered to.

Tuberculosis affecting the seminal vesicles alone or associated with tuberculosis of the testicles or prostate is operable, whereas a simultaneous tuberculosis of the lungs, kidneys, or bladder is inoperable.

The seminal vesicles may be removed either through the prerectal incision of Dietl and Zuckerkandl, or by the method of Fritz König, or by the Young's method, through a suprapubic incision.

THE PROSTATE.

Describe the prostate.

The prostate gland is a genital organ, one-third glandular, two-thirds musculofibrous. The gland surrounds the vesical end of the urethra, and is placed immediately in front of the bladder. It is an irregular truncated cone. Its apex rests against the posterior layer of the triangular ligament, its base toward the bladder. It is supported by the puboprostatic ligament and the anterior fibers of the levator ani muscle. Besides the urethra the prostate surrounds the lower end of the spermatic ducts. The prostate is composed of two lateral lobes which develop independently during the first half

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of intra-uterine life, and then become united behind the urethra by the posterior commissure, and at the same time covering over the urethra, by a thin layer, the anterior commissure. In the adult the lateral lobes of the prostate are felt as bosses on the under surface of the organ, and the posterior commissure is felt as a groove.

How may the prostate be examined?

By rectal touch and by determination of the urethral length. To examine the prostate by rectal palpation, the patient leans over a table with his left knee resting on the seat of a chair. The finger is introduced into the rectum for about $1\frac{1}{2}$ inches. The normal prostate is faintly perceptible as a heart-shaped body $1\frac{1}{2}$ inches long with its apex downward.

The examination should elicit whether there is tenderness, hard nodules, enlargement, pulsation, heat, or fluctuation. The prostate may be stripped by withdrawing the finger, pressing on a single lobe at a time in a to-and-fro movement, and the resulting secretion may be made into a smear, stained, and examined for tubercle bacilli, gonococci, or malignancy.

What conclusions may be drawn from the examination of the expressed prostatic fluid?

If the fluid contains pus corpuscles, shreds, or epithelium—possibly micro-organisms, even the gonococci—(fluid expressed from the common ejaculatory duct or seminal vesicles not included), the condition is one of chronic prostatitis; if tubercle bacilli are found, tuberculosis of the prostate should be suspected; if leukocytes, cylindrical epithelium and concentric amyloid concretions are found in the white milky fluid, having an acid reaction and not sticky, soapy to the feel nor cohesive; and if the crossed-bucksaw crystals (Böttcher's crystals) are developed under the microscope by the addition of a drop of a 1 per cent. solution of phosphate of ammonium, true prostatorrhoea is present.

What is meant by urethral length?

The distance a catheter must travel from the meatus before drawing urine, usually from 7 to $8\frac{1}{2}$ inches. An increase in the normal length indicates enlargement of the prostate.

Name the injuries, deformities, and diseases of the prostate.

Extrophy of the roof, lodged foreign bodies (stone and concretions), tuberculosis, inflammations, and hypertrophy.

What is extrophy of the prostate ?

Failure of the halves to unite. The treatment is similar to that for the correction of complete epispadias.

What stones, concretions, and foreign bodies may be found in the prostate ?

Stones in the prostate are of two varieties—those found in the urinary tract, which are wedged in from the prostatic urethra, and those originating within the prostate from prostatic secretion. Stones formed in the prostate are made up of phosphates and epithelial detritus and rarely become large enough to make surgical interference necessary. Numerous small ones may cause atrophy of the gland by lowering its nutrition. Small stones may evade both the rectal touch and the urethral sound. The symptoms of stone in the prostate are those of chronic prostatitis or abscess, or of stone in the bladder.

Foreign bodies introduced into the urethra may penetrate the prostate.

What is the treatment of stone and foreign bodies in the prostate ?

For stone, perineal section. For foreign bodies introduced through the urethra, the illuminated endoscope and proper forceps may secure the object, otherwise perineal section and removal.

Describe tuberculosis of the prostate.

Primary tuberculosis is most common in those having the tubercular diathesis, and usually is preceded by chronic gonorrheal prostatitis. The disease may follow a chronic posterior urethritis or appear spontaneously, and may be confined to one lateral half of the organ for years. If its origin is spontaneous, dysuria and a glairy discharge from the meatus occur, accompanied by hematuria without antecedent symptoms. Tubercular lesions elsewhere in the patient, tubercle

bacilli in the urine, small nodules felt on rectal palpation, spontaneous hemorrhage, a peculiar and acute irritability of the prostatic urethra, all point toward tubercular prostate. The prognosis is always unfavorable.

What is the treatment of tubercular prostate ?

General treatment such as is useful in other forms of tuberculosis. If symptoms referable to the bladder predominate, then sublimite instillations used for vesical tuberculosis may be tried.

Surgical treatment consists in removal of the entire prostate, together with the seminal vesicles, provided there was no associated tuberculosis elsewhere.

Where there is abscess formation, it may be liberated through the classical perineal incision or through the pre-rectal incision. The abscess cavity should be curetted and packed with iodoform gauze, and fistulæ laid open and similarly treated.

What are the inflammatory diseases of the prostate ?

Simple acute prostatitis or congestion, acute follicular prostatitis, parenchymatous prostatitis, and chronic prostatitis.

What is simple acute prostatitis ?

A congestion of the gland which may follow a posterior urethritis. It is engorged with blood and very tender. The symptoms of posterior urethritis predominate. The treatment of simple acute prostatitis consists principally in complete rest, hot rectal douches, and, if necessary, rectal suppositories. The posterior urethra requires attention. (See page 171.)

What is acute follicular prostatitis ?

A more intense inflammation than the simple variety. The prostatic ducts and superficial glandular structures become engorged with pus, or their orifices even occluded, so that small abscesses may form which are known as follicular abscesses. The symptoms may be quite severe. Strangury and pain during urination is marked. The urine is flocculent or cloudy, and comma-shaped bodies are nearly always present. By rectal touch one or more hard lumps may be felt which are painful when pressed upon. The condition may

terminate in suppuration or resolution. When suppuration occurs, the discharge is usually through the urethra and the sac is closed by granulation repair.

What is the treatment of acute follicular prostatitis?

Rest in bed, light diet, aconite for fever, and diluents to render the urine bland. If suppuration occurs operative interference may be necessary. (See Prostatotomy for Abscess of the Prostate, page 71.)

What is parenchymatous prostatitis?

An inflammation of the mass of the prostate gland which occurs as a sequence of follicular prostatitis. The inflammation reaches its climax within a week and terminates in resolution, suppuration, or induration. The diagnosis of parenchymatous prostatitis depends upon finding an enlarged gland, accompanied by pain and tenderness in the perineal region and rectum. Flat stools from the encroachment of the swollen gland upon the gut are sometimes seen. The swelling of the prostate may be gradual or an abscess may develop, as shown by a throbbing pain in the perineum, and chills, fever, and sweating.

When the destructive process advances and an abscess forms, the symptoms are very severe. There is great prostration, the tongue is dry and coated, and micturition difficult or impossible. Palpation through the rectum reveals the presence of a fluctuating mass, unless the suppuration extends away from the rectum. In such a case puncture through the rectum, for diagnosis, is permissible. It is done by plunging a small trocar into the portion of the prostate in which pus is suspected.

Parenchymatous prostatitis cannot be diagnosed early without rectal examination, because its symptoms correspond so nearly to those of the deep urethral inflammation which accompany it.

What is the treatment of parenchymatous prostatitis?

The patient should be put to bed and the pain controlled by opiates. If there is considerable tenesmus, santal oil should be administered in capsules (10 drops to the capsule) or in emulsion form every four hours. Continuous irrigation

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of the rectum with hot water for half an hour at a time is an invaluable local treatment. Aseptic catheterization may be necessary. Salicylic acid in small doses often repeated is highly recommended if suppuration has occurred or an incision must be made.

In a general way, it may be stated that the gland should be incised from the nearest point to the focus of suppuration. If the perineum is swollen the incision should be made there ; if the suppurative process has extended to the rectum, then the abscess may be opened by the rectal route.

The abscess can be opened through the prerectal route, thus avoiding wounding the rectum.

Describe chronic prostatitis.

This form may originate from an acute attack, particularly the follicular form, or from the extension of a chronic inflammation from the posterior urethra, either simple or specific or from sexual excesses. A catarrhal inflammation develops in the crypts and follicles of the glands and the cavities may be filled with pus.

What are the symptoms of chronic prostatitis ?

Frequent and-imperative urination, the presence of a sticky, glairy discharge at the meatus after urination, sexual feebleness, hypochondriasis, and in some cases impotence.

The posterior urethra is shown by the bulbous bougie to be exquisitely tender, and the illuminated endoscope reveals congested granular spots. Digital examination demonstrates the prostate to be tumefied.

Böttcher's crystals, which are peculiar to the prostatic secretion, may be demonstrated by the microscope.

What is the general treatment of chronic prostatitis ?

Attention to the mental distress, which is common in this disease. The patient should be assured that he can be cured. Then should follow instructions as to regimen to improve general health. Vegetable tonics should be administered, and the constipation which is usually present should be regulated, preferably by salines which attract fluids from the congested neighborhood. The patientshould maintainsexual calm.

What is the local treatment of chronic prostatitis?

Irrigation of the rectum daily for a quarter of an hour with water as hot as can be borne is of real value; so also are hot sitz baths of like duration; both may be given oftener if beneficial.

The tenderness of the gland having been diminished somewhat by the hot-water treatment, its contents should be expressed by massage through the rectum, and the irrigation, bath, or both, used *pro re nata*.

If there is at this time considerable pus discharging from the posterior urethra, that part of the tube should be irrigated; or, if the inflammation in that region is subacute, instillations should be used.

Soundings are of decided benefit, but should be discontinued at the first indication of any awakening of inflammation in the parts. When prostaticorrhea is the most marked symptom, the cooling sound may be used. It is a hollow sound which allows a stream of water to flow through it, keeping it cold as it lies in the prostatic urethra. This sound combines the effect of pressure and cold. It should be used every day or two for fifteen minutes.

The prognosis of chronic prostatitis, so far as ultimate recovery is concerned, is not unfavorable; but there must be long painstaking treatment, which is likely to be punctuated by slight relapses.

Describe hypertrophy of the prostate.

An increase in volume and alterations in form of the prostate gland which is common in the aged.

What are the symptoms of hypertrophy of the prostate?

The margins of the prostate can be distinctly outlined by a finger in the rectum, the gland is firmer than normal, the sulcus between the two lobes being obliterated. Its bilateral symmetry is usually lost through inequality of the enlargement of the lobes.

Behind an enlarged prostate there may be a pouch of bladder wall which constantly holds residual urine in spite of forced efforts to evacuate it. When the hypertrophy becomes considerable, urination is frequent, especially at night;

the stream lacks force and there is burning along the urethra following the act.

Complete retention of urine is common when the disease has been of considerable duration, and may occur at any time from congestion of the bladder neck. A feeling of fullness in the perineum is the only discomfort in the early stages of the disease, but in advanced cases there are considerable pain and tenesmus, piles, prolapsus ani, and occasionally hematuria. There is loss of appetite and weight, and the patient becomes cachectic. Continued tension of the bladder eventually affects the function of the kidneys, and uremic intoxication is common. Stricture of the urethra is differentiated by a history of urethritis, diminished urination during repose, and the fact that an increased effort aids rather than retards the stream.

What is the treatment of hypertrophy of the prostate ?

Symptomatic and surgical. Symptomatic treatment consists in guarding the patient against those injurious influences which are known to produce such unfavorable conditions as congestion and engorgement of the gland.

Attacks of strangury, pain, and difficult micturition may be combatted by hot sitz-baths and hot applications to the hypogastric region and perineum, together with the use of opium suppositories. These measures, combined with the avoidance of sudden chilling, promptly overcome the congestive attacks.

The principal symptomatic treatment is catheterization. If possible, only the soft catheter should be used by the patient. If the soft catheter cannot be used, silk-web catheters, with Mercier's or Guyon's curve, should be tried. The curve of the instrument should glide along the superior wall of the urethra, as that surface is the least resistant.

The self-retaining catheter (Pezzer, Malecot, or Bonney), with leg urinal, may be useful.

What are the indications for operation on the prostate ?

If in spite of palliative treatment the patient is failing in strength, or if there is unconquerable irritability of the bladder, or persistent ammoniacal cystitis, or progressive toxemia or septicemia, or increasing renal dilatation, or suppuration,

an operation is imperative, because in it lies the only hope for the patient. Pyelonephritis is a contra-indication.

What are the several operations for hypertrophy of the prostate ?

The palliative operations are : suprapubic aspiration, suprapubic cystotomy, perineal cystotomy, castration, and vasectomy.

The radical operation is prostatectomy.

Describe suprapubic aspiration.

At any time when there is complete retention of urine, from any cause, and the bladder cannot be catheterized, aspiration is a proper procedure. A flat percussion note above the pubes indicates that the intestines are out of the way.

There are a number of good aspirators. The surface to be punctured should be surgically clean and local anesthesia produced. The needle should be boiled, and the aspirator tested. Plunge the needle through the abdominal wall in the median line, $\frac{1}{2}$ inch above the pubic bone. Attach the aspirator, and, if no urine comes, push the needle deeper, when it will reach the urine.

After aspirating, maintain suction while withdrawing the needle, to prevent dribbling of urine in the punctured wound. After removing the needle, put a patch of sterilized gauze over the opening and retain it in place with an adhesive strip. Under proper aseptic precautions this operation if done correctly may be resorted to a number of times.

Describe suprapubic cystotomy.

The patient lies upon his back with the hips slightly elevated, or the Trendelenburg position can be used. The operation is that for suprapubic lithotomy. (See page 90.) For drainage, "Gibson's tube fixation apparatus" is successful. The drainage tube is placed in the bladder wound, which is sutured about it. Two inversion sutures are then introduced above and below the tube. These are tied and a second row introduced. The tying of these completes the closure. The inversion sutures leave the opening in the bladder, after the catheter has been removed, in a funnel shape, which rapidly heals from intravesical pressure.

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Describe perineal cystotomy.

With the patient in the lithotomy position a grooved staff is introduced into the bladder, pressed forward toward the perineum, and held in place by an assistant. A puncture is made in the perineum in the median line down to the groove of the staff, making the external wound not more than 1 inch long. The object is to open the membranous urethra, avoiding the bulb. To do this the finger should be introduced into the rectum and the apex of the prostate found. The point of the scalpel is then guided by the finger so as to open the urethra just in front of this point, due care being taken not to wound the rectum at the same time. Before removing the scalpel a blunt-pointed bistoury or Blizard knife is introduced alongside of it into the groove of the staff. The scalpel is removed and the staff and bistoury (or Blizard knife) pushed forward together into the bladder. A female catheter is then introduced through the perineal wound alongside the staff into the bladder. A spurt of urine shows that the bladder has been entered. The catheter is then replaced by a grooved director and the staff removed. The finger should then, if possible, be passed into the bladder, alongside the director. Constricting bands are severed and, when a free passage is secured, the director is removed. A large perineal tube is introduced, the bladder washed out, and then the viscus is drained through a tube. The tube is held in place by passing two tapes X-wise over each groin and gluteal fold to a bandage belt. Gauze and pads are added for external dressings.

Describe castration for hypertrophy of the prostate.

For description of castration, see page 47.

The operation of double castration, for enlarged prostate, has practically been abandoned as useless.

Describe vasectomy for hypertrophy of the prostate.

This operation has proved successful in reducing the prostate, in a few cases, and is done as follows:

Incise the skin immediately below the external abdominal ring, expose the cord, separate the vas from the other struc-

tures of the cord, and divide it between two ligatures. Suture skin wound and dress dry.

What is prostatotomy?

Literally, cutting into the prostate. The operation may be done through the suprapubic or the perineal route, and is chiefly designed for the relief of the obstruction to the flow of urine from the bladder. Cutting into the prostate is also performed for the relief of abscess of that gland and for the removal of concretions, calculi, and other foreign bodies. For the relief of the obstruction to the flow of urine a median or lateral groove or both may be burned or cut through the prostate by either route in the hope of establishing free egress for the urine.

Since it is well established that partial removal of the obstruction is followed by poorer results and by a higher mortality than total (practically) removal of the prostate by any method, prostatectomy is the operation of choice. The operation of Bottini done with a cautery knife concealed in an instrument somewhat similar to a lithotrite in shape, which is passed through the urethra, is a typical operation, while a modification of this operation is performed through the perineal route. Removal of middle and lateral lobes have been accomplished through the suprapubic route.

Describe prostatectomy.

This operation may be performed through either the suprapubic or perineal route.

By the *suprapubic route* there should be a few days of preparation. If there is cystitis, the bladder should be emptied by catheter every three hours, day and night. Irrigation, unless there is a large amount of mucus, is not necessary. As an internal urinary antiseptic, salol in 5-grain doses may be given every four hours. A little cardiac stimulation is usually wise, and the kidneys should be well flushed by copious draughts of water.

The bladder is exposed as described for suprapubic cystotomy (see page 69), and, after being opened, is explored by the finger; stones, if present, are removed, and the prostate is carefully palpated.

An assistant inserts his finger into the rectum, pushing up the prostate so it may be caught firmly by the volsella. An incision is then made with scissors into the substance of the prostate through its capsule, and enucleation performed with the fingers.

After the enucleation is completed the bladder should be flushed thoroughly with hot saline solutions, and the prostatic portion of the wound lightly packed with gauze. This may be done with the finger or through a proctoscope inserted into the wound. In forty-eight hours the gauze should be removed, a tube inserted, and siphonage established, the long end of the siphon being kept full by a slow stream from an irrigating bottle. It is rarely necessary to pass the catheter during convalescence, but the bladder must be frequently flushed through the siphon tube. The tube can be removed about the second week (Howard Lilienthal).

By the *perineal route* the operation is carried on between the bulb of the urethra and the anterior surface of the rectum. To expose this region an inverted V-incision through the skin and superficial fascia is made, with its apex over the posterior part of the bulb and its branches extending to a point between the anus and the ischial spines on each side. This procedure allows the rectum to be retracted and gives a free exposure of the field of operation. Through the inverted V-incision the central tendon of the perineum is exposed by blunt dissection and divided, which exposes the recto-urethralis muscle. This muscle covers the membranous urethra and the entrance to the retroprostatic space (the field of operation) and the apex of the prostate. The recto-urethralis muscle is carefully divided and the membranous urethra exposed. Upon the grooved staff previously passed into the bladder a longitudinal incision is made. The staff is withdrawn and a sound passed through the newly made opening into the bladder. After thus enlarging the canal the prostatic tractor is introduced. When in position the tractor is opened and pressure made so as to bring the posterior surface of the prostate into view, forcing the gland down to almost a level with the surface wound. After exposure of the gland, two divergent incisions are made through the posterior surface

of the prostate so that the ejaculatory ducts and floor of the urethra lie between them uninjured. Through these incisions the corresponding lateral enlargements can be enucleated, and a median bar or lobe, even of large size, can be drawn by the tractor, so as to project into one of the lateral cavities left by the enucleation, and there enucleated from its side, without disturbing the ejaculatory ducts or urethra. In cases where the median lobe is so adherent or so small that the tractor will not engage, the enlargement can be pushed into the lateral cavity by the index finger. To accomplish this the finger is introduced (the tractor having been withdrawn) through the opening down the prostatic urethra until the end is free in the bladder. The finger should then be hooked over the projection and direct it into the lateral cavity for enucleation.

In the rare cases where tractor and finger both fail the median lobe may be caught by a curved clamp, drawn down the dilated urethra, and enucleated or divided with scissors.

Where calculus is present it is best to remove it intact through the perineal incision. If it is too large to be dragged through without injury to the ducts or neck of the bladder, the urethra should be split with scissors along its left lateral wall from the urethrotomy wound in the membranous urethra up to its vesical orifice. By this incision the urethra becomes a common cavity with that left by the enucleation of the left lateral lobe, and abundant room is furnished for the extraction of the stone. If the calculus is too large to pass through, the cavity may be still greater enlarged by a cut with a probe-pointed bistoury through the vesical mucous membrane covering the left lateral cavity of the prostate. This can be done without injury to the ejaculatory bridge or to the urethral or vesical mucous membrane.

After the enucleation is completed the bladder should be flushed with hot saline solutions and a double drain (two catheters tied together) inserted into the bladder, fastened by a suture at the apex of the skin wound. Continuous irrigation should be established; the lateral cavities should be packed with gauze, but no extracapsular packing used.

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It is best to support the thin rectal wall by drawing together by a single suture the edges of the levator ani muscle, thus restoring the perineum and protecting the rectum from being pressed upon by the gauze packing. The gauze and tubing should be removed on the second day.

The after-treatment consists in abundance of water by mouth (or infusion), getting the patient out of bed as soon as possible, and avoidance of instrumentation (Hugh H. Young).

What is prostatorrhoea ?

A functional disorder of the young and middle-aged, characterized by excessive secretion of the prostate gland and depending upon congestion of some of the parts in physiological relation. These conditions may be chronic posterior urethritis, stricture, violent masturbation, or sexual excesses.

It is a grave matter only from the nervous symptoms at times associated with it. Its only constant evidence is the escape of a clear mucous fluid. The discharge varies greatly in amount and may contain pus cells or show traces of blood. There may be residual urine, owing to the contraction of the sphincter caused by the prostatic trouble, as a result of which the bladder cannot completely empty itself. Another symptom is the expulsion of sandy masses with the last drops of urine. The discharge is greatest in quantity following a hard stool. Disturbance of the sexual function may be present and out of proportion with the change in the prostate. Sexual desire may be exalted and the act satisfactory, or there may be excessive desire with feeble erection and premature emission. A few patients with prostatorrhoea are impotent.

Prostatorrhoea should not be confounded with the viscid drop of secretion from Cowper's glands and the urethral follicles which appears at the meatus after prolonged sexual excitement without gratification.

What is the treatment of prostatorrhoea ?

Regarding the milder forms, treatment is demanded only when the nature of the filaments is such as to demand its

institution. If the filaments consist of epithelial cells and a few leukocytes, and if repeated examination shows them to be free from microorganisms, no treatment is necessary.

If the secretion contains pus or bacteria, irrigations of the bladder with nitrate of silver solution, 1:5000, 1:1000, or sublimate solution, 1:10,000, massage of the prostate, and judicious sounding, all have a place in the treatment.

SPERMATORRHEA.

What is spermatorrhea?

A flow of semen without orgasm.

It is a symptom of irritability of the sexual apparatus, and is rare except in the advertisements of quacks. Its causes are the sexual brutalities, such as masturbation, protracted contemplation of venery, and ineffectual efforts at coitus. Patients suffering from irritable genitals or prostaticorrhea are always pathophobic and often hypochondriac. To them a drop of glue at the meatus, following a hard stool or a period of sexual excitement, is evidence of loss of manhood, which is punishment for sins of omission, commission, and emission. The depression from the conviction that they have lost, or are about to lose, the genesic function, produces disturbance of digestion, headache, fugacious pains, and symptoms generally grouped as neurasthenia.

These patients are taught by the advertising specialists that amorphous phosphates and urates, shreds and precipitated mucus in the urine, are all lost semen.

What is the treatment of spermatorrhea?

That for the general condition of the sexual apparatus, of which it is a symptom. In imaginative spermatorrhea, psychotherapy is most important.

What are diurnal emissions?

Seminal incontinence while one is awake.

They occur from slight peripheral excitation or from lascivious thoughts, indecent pictures, etc. They are symptoms of a condition which should be diagnosed and treated.

What are nocturnal emissions ?

Ejaculation of semen during sleep.

From puberty the healthy and continent man has at irregular intervals erotic dreams, in which he passes through the sexual act. His erection is satisfactory, his sensations those incident to coitus, and his misplaced emission complete. The cycle is produced by reflex irritation. Its frequency is influenced by the man's degree of health, the fatigue incident to his work, and by the temptations he resists. If emissions are too frequent they are followed by languor, headache, mental lethargy, and often by hypochondriasis. If nocturnal emissions occur with less than a ten-day interval, or if they do not produce ecstasy, or if there is no recollection of them, they are pathologic.

What is the treatment of nocturnal emissions ?

That for the condition responsible for the erethism which produces them. They are the same as those chargeable with prostaticorrhea and impotence. Frequently a full bladder or distended seminal vesicles produce nocturnal emissions. If there is no diseased organ the patient should be informed that such emissions are natural to the healthy continent man, and that they therefore conserve health. In the unmarried, absolute continence is entirely compatible with robust health.

IMPOTENCE AND STERILITY.**What is impotence ?**

An inability on the part of the male to perform the sexual act properly, either on account of a failure of the penis to become erect or because the ejaculation of semen does not occur at all or takes place before the penis has entered the vagina.

How is impotence classified ?

Organic, psychic, atonic, symptomatic, paralytic, and drug impotence.

What is organic impotence ?

An inability to deposit semen in the vagina because intromission is mechanically impossible from such conditions as

hypospadias, epispadias, tumors, corpulence, or from syphilitic or fibroid induration of the corpora cavernosa.

What is the treatment of organic impotence ?

Removal of the obstacle.

What is psychic impotence ?

Failure of penile erection from the effect of mental perturbation. The erection fails at the moment its usefulness seems assured. The largest class of these patients are young men who fear that they have injured themselves by masturbation. In other cases the erection is lost from a sense of fear of discovery or of disease, or from disgust.

What is the treatment of psychic impotence ?

Psychotherapy. The patient's confidence must be won, and to this end it is necessary to give him ample time for the narration of his trouble, real and imaginary. In many cases of impotence classed as psychic a careful investigation will show some pathologic condition.

What is atonic impotence ?

A failure of the sexual nervous center in the lumbar cord to produce erection of the penis. If the genital center in the brain is not exhausted also, sexual desire is present. There may be a partial erection accompanied by premature ejaculation.

Atonic impotence is oftenest seen in married men who have been excessively assiduous in family duty or have frustrated nature by the sin of Onan. Before making the diagnosis of atonic impotence, diseases of the genito-urinary tract and nervous system should be excluded.

What is the treatment of atonic impotence ?

Build up the general system, while complete rest is given the genital centers in the brain and cord, in order that their energy may be restored. Sexual excitement and intercourse should be prohibited. Some cases need sedatives, and all need tonics. After marked improvement of the general health, stimulating drugs, such as phosphate of zinc and nux,

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should be administered. Damiana is at all times useless and cantharides is dangerous when the genital tract is irritated. The constant current with the positive pole applied over the lumbar region, and the negative pole used to stroke the parts, is often beneficial. When function is restored indulgence should be moderate.

What is symptomatic impotence ?

A failure of erection because of a pathologic condition of brain, cord, or genito-urinary tract. Erections may be feeble and premature; ejaculations may occur, or they may be absent. If the genital center in the cortex of the brain is not diseased the patient has the normal desire without the ability to satisfy it. Chronic gonorrhea, sexual excesses, masturbation, Onanism, and stricture of the urethra are the local causes of this form of impotence.

What is the treatment of symptomatic impotence ?

The treatment of the condition upon which it depends.

What is paralytic impotence ?

Impossible or imperfect erection because of disease or injury to the brain or spinal cord. The treatment is that for the disease or injury of the cord or brain.

What is drug impotence ?

The loss of sexual power from the long-continued use of such drugs as cocaine, opium, chloral, and the bromids. The treatment is to stop the use of the drug and build up the general system.

What is sterility ?

A rare condition characterized by absence of spermatozoa in the semen. Sterility does not modify the sexual appetite nor diminish the power and pleasure of its gratification. The most frequent cause of sterility is bilateral obstruction of the seminal ducts. There is no satisfactory treatment.

What is the composition of the normal semen ?

It consists of the testicular secretion which contains the

spermatozoa, the secretion of the seminal vesicles, the prostate, Cowper's glands, Morgagni's crypts, and Littre's glands. The secretion of the various glands is extruded during the orgasm, their use being to add bulk to the menstrum, in which the life-producing spermatozoa are to float in the female genital tract. The usual amount of semen discharged at one ejaculation is from 2 to 4 drams; but the amount may be greatly reduced if coitus is repeated with excessive frequency. Microscopically the spermatozoa look like tadpoles. They continue to show movement at least twelve hours after ejaculation, and will present signs of life for forty-eight hours if sheltered from light and cold.

How are the pathologic changes in the semen classified?

1. Azoöspemia. 2. Oligospermia. 3. Necrospemia. 4. Aspermia, absolute or temporary.

What is azoöspemia?

Entire absence of spermatozoa. If caused by too frequent seminal emissions, either from excessive masturbation or coitus, a few days' rest usually results in their return. In the adult it may be caused by mechanical obstruction of the seminal duct, or from disease of the parenchyma of the testicle when there is no return of the spermatozoa.

What is the treatment of azoöspemia?

Occlusion of the secreting tube from syphilitic epididymitis may be repaired by antisyphilitic treatment. Occlusion from injury and from gonorrhea is permanent. When occurring from a cancerous or a tubercular testicle the organ should be removed.

What is oligospermia?

A temporary scarcity of spermatozoa. It is found at the beginning of puberty and in old age, in general debility, and after repeated acts of sexual intercourse.

Epididymitis and syphilitic, tubercular or malignant growths which involve but one testicle are the common mechanical causes. Oligospermia is transitory, terminating in entire disappearance of spermatozoa or a return to the normal. The treatment consists in removing the cause.

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What is necrospemia ?

The presence of lifeless spermatozoa found upon microscopic examination of the semen. To avoid error, the semen should be examined within two hours after its ejaculation into a condom during coitus. It should be kept warm until it is put under the microscope. The causes of necrospemia are those which diminish the secreting capacity of the testicles. Alcoholism, morphism, general tuberculosis, and diabetes, by depressing nutrition, have the tendency to cause death of the spermatozoa. Admixture of pus with the semen destroys the vitality of the spermatozoa.

What is aspermia ?

A condition in which the male is able to perform coitus properly, but there is no secretion of spermatozoa. It may be either congenital or acquired. Congenital aspermia is due to some error of development. Acquired aspermia is due to inflammatory affections of the tract. There is no advisable treatment.

What is bacteriuria ?

The growth of bacteria in the urine in a healthy bladder. The urine is turbid and fetid when freshly voided, and centrifugation shows enormous numbers of bacilli coli communis or other bacteria. The manner of entrance of these bacilli is not always readily determined, but bacteriuria is usually preceded by hematuria, catheterization, gonorrhea, or pelvic inflammation. Urination may be frequent and accompanied by a burning pain in the urethra. The disease may be intermittent, acute, or it may become chronic, the bladder remaining free from disease and the general health unimpaired. The diagnosis depends upon the microscope, and the prognosis upon the discovery and removal of the source of infection.

What is the treatment of bacteriuria ?

The habitat of the bacillus being the colon, enteritis and constipation should be cured. Posterior urethritis or stricture should be given attention. When no cause is discoverable, salol, methylene-blue, and urotropin should be administered

by the mouth to destroy the bacteria. Irrigations of the bladder are ineffective. The patient should drink freely of pure water.

THE BLADDER.

Describe the bladder.

The bladder is a muscular sac lying, in the male, between the rectum and the pubes when empty, and distending when full into an oval bag occupying the hypogastrium. Its position is fixed below by the urethra, the pelvic fascia, and by the rectovesical fascia. The organ is covered on the outside by the peritoneum, on the inside by mucous membrane. The peritoneum is attached loosely at the base so as to allow freedom of movement. When empty the viscus lies behind the symphysis. The peritoneum leaves the walls of the abdomen at the symphysis and passes directly to the bladder, over which it spreads, and then passes to the rectum from the base of the bladder. When the bladder is empty, it is impossible to aspirate it from the abdominal wall without wounding the peritoneum. When the bladder is distended, it carries the peritoneum up with it in front so that a space on the bladder wall becomes bare of peritoneum. This gives the safe point for the introduction of the aspirator needle directly above the symphysis in the median line.

What is the shape of the bladder ?

It varies with age. In infancy it is ovoid, with its large axis running downward and a little forward, and its apex at the urethral orifice. When full it lies almost entirely out of the pelvis. As age advances the bladder sinks in the pelvis; its shape becomes spherical when filled, and has a flattened floor. In old age the floor of the bladder becomes pouched. The muscles of the bladder are composed of three coats, external, middle, and internal. The external fibers run from the prostate over the fundus, meeting those running in a like manner from the anterior surface. The middle layer forms the bulk of the vesical muscle; its fibers are densely interlaced and are circular. The internal fibers are scattered bundles of longitudinal fibers.

Describe the mucous membrane of the bladder.

It has a pale salmon color, is insensitive in health, and lies in folds when the bladder is empty, except over the trigone, where it is always smooth.

What is the neck of the bladder ?

The point of commencement of the urethra. The portion of the bladder immediately surrounding the neck is in relation with the prostate.

What is the trigone ?

The trigone, situated at the base of the bladder, is a triangular region, with sides some four-fifths of an inch long lying between the orifices of the urethra and the two ureters. The muscle here is denser than in any other part of the organ.

What is cystoscopy ?

Ocular examination of the interior of the bladder by means of a specially arranged apparatus called the cystoscope, which is built on the plan of a hollow sound with an obtuse angle, within which is situated an electric lamp. The instrument is provided with a passageway for catheters, which may be detached, allowing the withdrawal of the cystoscope without the removal of the catheters from the ureters. In the American instrument the vision is direct, and the bladder is distended with air or fluid.

Describe the preparation for cystoscopy.

For twenty-four hours before cystoscopy the patient should take medicine to render the urine bland and unirritating. At the time of the operation the bladder should be thoroughly irrigated with a solution of boracic acid and the residual urine drawn with a catheter. The instrument, of course, must be surgically clean.

Place the patient on the table so that his shoulders, as well as his buttocks, are slightly elevated and his feet apart in stirrups. Anesthetize the anterior urethra with a 4 per cent. solution of eucaïn. Introduce the cystoscope as you would a sound, with catheters, window, and obturator in place; then inflate the bladder and turn on the light.

Once introduced, the instrument may be moved about and rotated on its long axis, so as to inspect the bladder and search

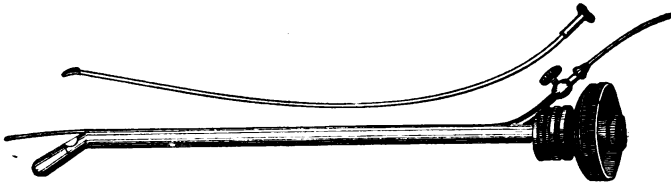


FIG. 18.—Brenner's ureter-cystoscope.

for the ureteral openings, which may be found at the angles of the trigone. There may be discovered a spurt of urine, which



FIG. 19.—Nitze's instrument in use.

indicates the opening, or they are recognized as oblique slits or slight elevations on the wall of the bladder.

The cystoscope should not be used during an acute inflammation of the bladder.

What is exstrophy of the bladder ?

A failure of the lateral halves of the bladder to unite during development. When the abdominal parietes alone have failed to unite, the bladder projects into the cleft—a condition known as *ectopia vesicæ urinariæ*. There may be absence of union of the pubic bones alone or together with the cleft in the abdominal wall. True exstrophy exists when the anterior wall of the bladder, as well as the abdominal wall, remains cleft.

If the symphysis, abdominal wall, and bladder have all failed to close in front, there is *eversio vesicæ*. If the symphysis is solid the condition called *fissura vesicæ superior* or *inferior* is present.

What is the treatment of exstrophy of the bladder ?

Slight deformity may be endured by the use of the rubber urinal. Where the cleft is large, surgical interference offers the only hope.

What is hypertrophy of the bladder ?

An overgrowth of the muscles of the vesical walls resulting from muscular exertion on the part of the bladder to empty itself when the urethra is obstructed by stricture or enlarged prostate. It sometimes occurs without apparent reason.

Concentric hypertrophy originates from frequent and violent contraction of the viscus, to expel the urine as soon as a few drops have entered the bladder.

Eccentric hypertrophy results from muscular exertion to expel large quantities of urine forcibly.

The prolonged contractile efforts distend the bladder at its weakest points and impair its sensibility. Atony supervenes and the amount of residual urine is greatly increased.

What are the symptoms of hypertrophy of the bladder ?

Irritability, which prevents the retaining of any considerable quantity of urine, marks the concentric variety, while

the eccentric variety is characterized by feeble power of evacuation.

What is the treatment of hypertrophy of the bladder ?

Remove the cause.

What is atrophy of the bladder ?

The final result of eccentric hypertrophy. Fibrous elements have entirely replaced the muscles and the bladder is permanently flaccid.

The only treatment is prophylactic—that for the preceding eccentric hypertrophy.

What is atony of the bladder ?

A lack of tone in its walls. The muscular investment is inherently feeble, but there is no change in its nerve supply.

What are the symptoms of atony of the bladder ?

Distended bladder, frequent demands to evacuate a small quantity of urine. During sleep the urine dribbles away. The backward pressure dilates the ureters, then the pelvis of the kidneys, which is followed by atrophy.

What is the treatment of atrophy of the bladder ?

Establish a free outlet for the urine. If the obstruction is removed, even in severe cases, the bladder muscles frequently regain tonicity.

What is paralysis of the bladder ?

A loss of contractile power in the bladder wall due to central nervous diseases which affect other organs also.

What is the treatment of paralysis of the bladder ?

Aseptic catheterization. The prognosis is as bad as that of the condition producing it.

What is retention of urine ?

The failure of the bladder to empty itself normally. It may be partial or complete. The chief causes of retention are hypertrophy of the prostate, contracture of the bladder neck, stricture and spasm of the urethra. In complete reten-

tion the area directly above the pubes gives a flat note on percussion and the distended bladder may be outlined. In suppression of urine the bladder is empty and gives a resonant percussion sound.

What is incontinence of retention ?

A dribbling of urine when the bladder is full to distention. Dribbling of urine should always lead the surgeon to examine the bladder, for continued retention causes partial incontinence, instead of rupture of the bladder, unless its walls are diseased. The bladder should be relieved by aseptic catheterization, drawing away only part of the urine at a time.

What is incontinence of urine ?

Enuresis—that condition in which the urine flows involuntarily from the bladder as fast as it enters from the kidneys.

What is the treatment of incontinence of urine ?

Remove the cause. The wearing of a rubber urinal should be advised, to protect the clothing.

Enumerate the wounds of the bladder.

Knife and gunshot wounds, contusions, rupture. In knife and gunshot wounds the injury is associated with the external conditions present. In contusions there is vesical hematuria, tenesmus, and impediment to the flow of urine by the formation of clots. In rupture of the bladder there are shock, sudden and intense pain in the abdomen, urgent desire to urinate, usually ineffective, and tenesmus, with perhaps the passage of a few drops of bloody urine. Death is likely to follow; but if reaction takes place a peritonitis may have to be combated. Rupture of the bladder requires immediate surgical interference.

How may vesical ulcers be classified ?

Tubercular, malignant, inflammatory, traumatic and simple. Tubercular ulceration is described under Tuberculosis of the Bladder.

Malignant ulcerations consist of exfoliations and superficial exulcerations of the mucous membrane.

Traumatic ulcers result from stone or operation for its removal.

Simple ulceration of the bladder is rare. It is found



FIG. 20.—Adenoma of the bladder (Clado).

singly and located usually on the posterior wall, and does not perforate.

The diagnosis of ulcer of the bladder is confirmed by the cystoscope. Pain due to ulcers is relieved by irrigations, and a cure follows curettement, through the cystoscope, unless they are of tubercular or malignant origin.

How may vesical tumors be classified ?

Epithelial growths, which are by far the most common ;
benign papillomatous growths, which soon undergo malignant



FIG. 21.—A, Epitheliomatous tumor; B, wart-like growths; C, villous growths around a vesical cell (Clado).

degeneration ; connective-tissue growths ; fibroma ; myxoma ; sarcoma ; and mixed tumors, as fibromyxoma and myxosarcoma.

Men suffer three times as frequently with tumors of the

bladder as women. Thirty per cent. of tumors of the bladder are malignant. The greater number of these tumors are found about the ureteral orifices and the neck of the bladder. The upper half of the bladder may be invaded by extension.

What are the symptoms of vesical tumors?

Innocent tumors rarely cause trouble unless they grow sufficiently large to obstruct the outflow of urine through the urethra or the inflow from the ureters, thus producing pressure upon the kidneys. Bleeding is usually the only symptom produced by papillomatous tumors and polypi.

Malignant tumors frequently cause cystitis, and the urine contains mucus, pus, and blood. This variety may be made out with the sound. Hematuria is probably the most important symptom and usually the first evidence of a vesical neoplasm. It may be intermittent or continuous. When intermittent it is likely to follow defecation or unusual exercise. The hemorrhage begins without warning, the early ones being of considerable amount, their severity gradually decreasing. The most constant symptom is frequent desire to urinate, and partial retention is common.

The diagnosis is confirmed by the cystoscope.

What is the treatment of vesical tumors?

Suprapubic cystotomy for their removal, or in some cases they may be eradicated through the operating cystoscope.

What is vesical calculus?

Stone in the bladder.

What are the symptoms of stone in the bladder?

Irritability of the bladder, pain most marked at the end



FIG. 22.—Thompson's evacuating stone-searcher.

of urination and at the end of the penis, and more or less blood in the urine.

The diagnosis should be confirmed by the cystoscope or Thompson's searcher. The treatment is removal of the stone.

Describe suprapubic lithotomy (Keyes).

This operation is performed not only for stone, but to allow the operator to explore the bladder and to treat the bladder for disease, to provide drainage or to remove tumors, etc. Illumination of the bladder through the incision by means of a drop (electric) light greatly facilitates operations in this viscus. For the removal of stone place the patient in the Trendelenburg position; draw off the urine,

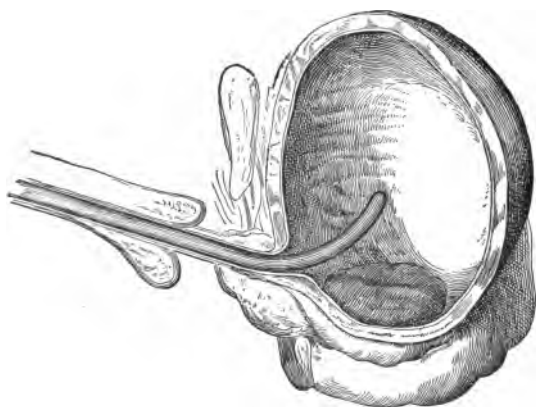


FIG. 23.—Calculus behind prostate (Coulson).

wash out the bladder with boracic acid solution; then inject (in adults) 10 to 12 ounces of boracic acid solution and withdraw the catheter, and tie a tape about the penis to prevent the escape of the solution. In children the bladder should not be distended with more than 2 to 4 ounces of the solution. If after the injection the bladder is not well lifted above the pubic bone, use the rectal bag. For adults the rectal bag should not contain over 8 to 10 ounces, for children not over 4. Make a 3-inch incision in the median line, terminating over the symphysis. When the perivesical tissue is reached, cut it. If the peritoneum should appear, push it

out of harm's way. (If the peritoneum is cut, repair it at once before continuing with the operation. Some defer the

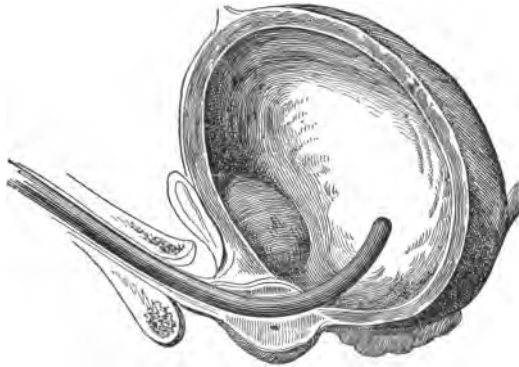


FIG. 24.—Bladder with calculus behind the pubes (Coulson).

operation until the peritoneal wound has healed.) Hold the abdominal wound apart with retractors. The large veins are

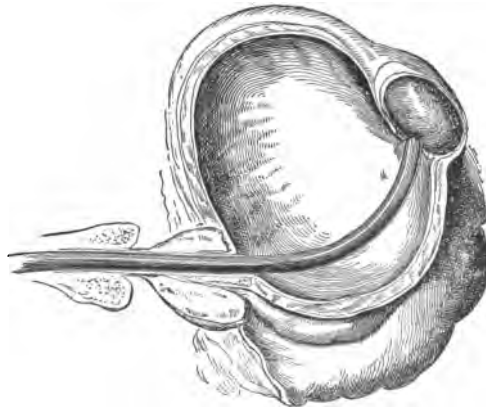


FIG. 25.—Bladder with an encysted calculus (Coulson).

seen on the surface of the bladder, giving it its blue color. Avoid the larger ones if possible, otherwise cut through, as

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hemorrhage ceases when the bladder relaxes. Clamp the bladder transversely with a pair of forceps at the upper angle of the abdominal wound, open the bladder in the median line above and cut toward the pubes, catch the edges of the bladder wound with forceps, remove the abdominal forceps, and make the wound gape by gentle traction with the side forceps, which gives room for the removal of the stone. Remove any incrustations that may be seen in the bladder, and finally irrigate the bladder with hot saline solution. Secure drainage by siphon. Suture the muscles and fascia at the upper end of the wound, dress dry, and pack with sterilized gauze. Immediate suture of the bladder may be employed. An excellent suture is the right-angle suture of Dr. Cushing. The silk should be sterile and fine. The sutures should not penetrate the entire bladder wall into the cavity. The abdominal wound should be closed to nearly its inferior angle, leaving only enough space for drainage. The drainage is important. The wick should lie against the stitches and protrude well out of the external wound. It is well to introduce a catheter, which may be retained in the urethra for several days without causing irritation if asepsis is employed.

What is cystitis ?

Inflammation of the urinary bladder. The causes of cystitis are: bacterial infection of residual urine, the presence of calculi, hypertrophy of the prostate, simple and specific urethritis. Exposure to cold may be a predisposing cause, by lowering resisting power. The micro-organisms which break up urea, forming ammonia, may cause cystitis in an otherwise healthy bladder. They are the staphylococcus pyogenes, the urobacillus liquefaciens septicus, and the bacillus coli. Micro-organisms may reach the bladder by way of the urethra, or ureters, lymphatics, or directly from the blood-vessels. Chronic cystitis frequently follows the acute form.

What are the forms of cystitis ?

Inflammation from mechanical causes, such as irritation from awkward instrumentation, from calculi, or from a very concentrated urine containing phosphates, urates, or oxalates, or from chemicals.

Cantharides, urotropin, the irritating vapor inhaled by coal-tar workers, excessively acid or ammoniacal urine may determine a cystitis. A mild cystitis may be set up by the instillation of irritants in the prostatic urethra.

For inflammation following instrumentation wash out the bladder with boracic acid solutions; for the irritation of stone, remove the stone; for phosphaturia, dilute hydrochloric acid is useful; for cystitis due to concentrated urine, diuretics should be given, the amount of nitrogenous food taken should be decreased and proper treatment for gouty, rheumatic, or dyspeptic tendency instituted.

What is simple bacterial cystitis?

The familiar form of acute or chronic cystitis in which the mucous membrane of the trigone and that of the openings of the ureters is the part usually affected. The muscular and submucous and even the serous coats may become involved.

The cystoscope shows the color of the mucous membrane to be a brilliant scarlet, and the branching lines of the distended vessels are easily seen. The surface of the mucous membrane appears roughened and has flakes of lymph adhering to it, and eroded spots may be seen; sloughs of mucous membrane or minute abscesses may be present in severe cases. Micro-organisms abound in the urine and in the epithelial layer of the bladder wall.

What are the symptoms of acute cystitis?

Taking gonorrheal cystitis as the type, inflammation occurs during a posterior urethritis generally about the third week, and there are present pyuria, hematuria, pollakiuria, and dysuria.

Pus in the urine is a constant symptom of cystitis. If the urine is acid in reaction, the pus makes it cloudy; but if the reaction is alkaline and ammoniacal, the pus is precipitated as a viscid, tenacious, ropy mass.

Hematuria is caused by the rupture of the capillaries in the bladder walls. Slight bleeding occurs in all cases of cystitis. The blood is well mixed with the urine.

Pollakiuria, or frequent urination, increased by walking or

riding, is a constant symptom. The bladder is intolerant of distention when its walls are irritable or inflamed.

Dysuria, or difficult urination, is another more or less constant symptom. Urination may be painful or incomplete. There is usually a fixed dull pain over the bladder, and, as the viscus contracts, the pain increases. The effort to urinate in a severe case of cystitis is a paroxysm of agony—tenesmus strangury—the pain being felt in the rectum, radiating to the thighs and glans penis. Pain is increased after the act of urination, and bloody micturition is common.

What are the constitutional symptoms of acute cystitis?

Those caused by absorption of the toxins resulting from the retained and decomposing urine within the bladder or from the presence of pyogenic microbes. The bacillus coli with the urobacillus liquefaciens septicus or staphylococcus pyogenes may enter the circulation, jeopardizing the life of the patient.

Describe the urine of acute cystitis.

The urine is usually acid, thickly purulent, and may be bloody. If the cystitis depends upon the development of ammonia in retained urine, the urine remains ammoniacal. The microscopic examination shows many pus cells and bacteria, with some red blood-corpuscles and epithelial cells. Owing to the presence of blood the urine will respond to the test for albumin; therefore filter the specimen before applying any test for albumin.

From what diseases must acute cystitis be differentiated?

From acute prostatitis and pyelonephritis. In acute prostatitis the examining finger finds in the rectum a hot, throbbing, swollen prostate. In pyelonephritis the examination of the urine shows renal pus, which sinks and becomes compact in the bottom of the glass, while pus from a cystitis is not all precipitated, and what does separate sinks slowly and forms a much less solid mass.

Upon what does the diagnosis of cystitis depend?

Frequent painful urination, the urine showing a uniform

turbidity from pus and bacteria by the two-glass test. Microscopic examination of the urine will show the character of the micro-organisms, the variety of urinary crystals, and the epithelial cells present. When both chronic cystitis and pyelonephritis exist the diagnosis is made as follows (Keyes) : Have the patient urinate in two glasses. Gently irrigate the bladder with boracic acid solution until the fluid returns clear. Flush the anterior urethra when withdrawing the catheter. One hour later draw the urine with a catheter. If the urine is as purulent as before, the pus is from the kidney. The differentiation of prostatitis and vesiculitis depends upon rectal examination by the finger. The vesicles and the prostate may be milked and the expressed secretion examined by the microscope.

Describe preventive treatment of cystitis.

The prevention of suppurative cystitis depends upon protection of the bladder from infection by micro-organisms, and the treatment of conditions of congestion or inflammation, especially of the posterior urethra, and the removal of causes which prevent the bladder emptying itself completely and of inflammation of the rectum.

Describe the general treatment of acute cystitis.

Put the patient to bed and avoid chilling of the body. Sitz baths, at a temperature above 100° F., for their relaxing effect, followed by hot bottles placed against the perineum, are advisable. In severe cases the food should be milk, and in all cases distilled or boiled water should be drunk very freely to dilute the urine.

The bowels must be well emptied, preferably by calomel.

Following this morphia should be given in sufficient quantity to control acute pain. It relieves the spasm in the bladder neck as nothing else can. Citrate of potassium may be given if the urine is definitely acid.

Santal oil in 10-drop doses, preferably in capsules, every four hours is a very satisfactory remedy in cases of severity, and opium and belladonna suppositories give relief. If the urine is heavy with bacteria a germicide is demanded, and methylene blue or urotropin should be administered in

2- to 5-grain doses every four hours. The oleoresins and cantharides should be reserved until the affection shows a disposition to become chronic. In very severe cases the urine, after having contained first blood, then pus and shreds, begins to give off an odor of decomposing flesh, an indication of destruction of the bladder mucosa. Externally, in addition to the sitz baths, a belladonna and aconite ointment applied over the scrotum and perineum gives ease. The most serious complication of cystitis is pyelonephritis from extension of the inflammation by way of the ureters to the kidneys.

Describe chronic cystitis.

Chronic cystitis almost invariably has a predisposing cause in some malady of adjacent and physiologically related organs. The removal of the diseased condition chargeable with the origin is necessary to its cure. The tendency of chronic cystitis is to grow worse until it is incurable because of structural changes in the bladder.

What is the pathology of chronic cystitis?

The mucous membrane becomes a dark-slate color from capillary hemorrhages. There are eroded spots in the mucous membrane and in old cases, ulcers. Prolonged inflammation produces an inflammatory thickening of the wall, which ultimately contracts, becoming sclerotic, so that it has no elasticity. The contracted bladder wall is in rigid folds, and its capacity may be reduced to an ounce. In some cases one or more folds dilate, forming serous sacs which are without power to expel their contents. This predisposes to the formation of calculi. In rare cases the bladder becomes greatly dilated, instead of contracted, from the organization of inflammatory infiltration.

The whole thickness of the bladder wall may become gangrenous and slough into the abdominal cavity.

What are the symptoms of chronic cystitis?

They differ from those of acute cystitis only in degree. There may be atrophy or hypertrophy of the bladder, and stone, tuberculosis, or tumor may complicate the condition. The frequency of urination may be slightly or markedly in-

creased and the act painful. The pain is usually slight if the prostate is not enlarged. The constitutional symptoms, if any, are mild, there being little absorption of toxins from the bladder. The disease is prone to relapse. Cold, violent exercise, alcoholic excesses, acid urine, and instrumentation are liable to produce an acute attack at any time during a chronic cystitis. If during a chronic cystitis micro-organisms which decompose urea gain access to the inflamed bladder a violent reaction occurs which is liable to involve the kidneys. The prognosis is then grave because of the probability of septicemia.

What is the condition of the urine in chronic cystitis?

It is cloudy; possibly bloody from a complicating stone or tuberculosis. Its chemic reaction has no value in making the diagnosis. In mild cases with little pus, the reaction is likely to be acid. In the grave cases in which there is decomposition of residual urine, the ammonia present gives the urine an alkaline reaction and the deposit from it is ropy mucopurulent, containing triple phosphates.

Give the general treatment of chronic cystitis.

If the patient suffers from pain and frequent urination he should remain in bed. Otherwise he may be about, great care being taken to avoid chilling by dampness or draughts.

Salol should be given if urination is painful or frequent, and urotropin or the oleoresins when the disturbance is less.

Give the local treatment of chronic cystitis.

If the cystitis depends upon calculus or hypertrophy of the prostate operative interference is demanded, as inflammation of the bladder cannot be modified by treatment until its cause is removed. If the bladder does not empty itself completely, a catheter may be passed twice daily. The practice of allowing a catheter to remain in position is risky. The matter of drainage may become so important as to suggest suprapubic or perineal opening. Washing out the bladder for the removal of bacteria and for medicating its walls is always a proper procedure. This may be done by attaching a catheter to a hard-rubber syringe. Introduce the catheter beyond the

cut-off muscle and slowly inject the fluid until a sensation of resistance or complaint of the patient indicates that the bladder is distended, then allow the bladder contents to drain through the catheter.

What are some of the solutions used in irrigating the bladder?

Normal salt solution, or boracic acid solution (2 grains to 6 ounces), should be used in measuring the bladder capacity and to stop fermentation. In suppurative cystitis nitrate of silver should be used twice a week, beginning with 1:4000 and gradually increasing to 1:1000. This solution should be retained in the bladder two or three minutes. Follow silver injections with the salt solution to neutralize the former if the reaction is too severe.

Describe tuberculosis of the bladder.

Usually secondary to tuberculosis elsewhere in the genito-urinary tract, but may be primary. Infection generally comes from the prostate or kidney. The former followed by ulceration at or about the bladder neck; the latter by ulcers in and about the ureteral orifice of the corresponding kidney.

The bladder may present a number of discrete tubercles developed beneath the epithelium, which are usually grouped, the intervening mucous membrane appearing red, swollen, and velvety.

As a result of breaking down, ulcers form. They are round and discoid, ranging in size from a dime to a five-cent piece and having a dirty yellowish-colored floor.

What are the symptoms of tuberculosis of the bladder?

Irritability of the bladder and hematuria.

Irritability is characterized by frequent and painful urination. At first the pain is not great, but at the end of the act, when the bladder contracts, there is severe sharp pain as the last few drops are expelled, felt along the under surface of the penis, in the glans, in the perineum, and often radiating down the thighs. The pain excites greater spasm, which in turn increases the pain so the acme is reached during the final expulsion. After ulcers have formed there is another

pain felt, occurring before urination. Urine pressure produces spasm of the bladder, which in advanced cases frequently extrudes the bladder contents in spite of every effort to the contrary.

Hematuria in tuberculosis of the bladder is an early, late, and constant symptom. The bleeding is not influenced by motion and exercise, thereby differing from that caused by

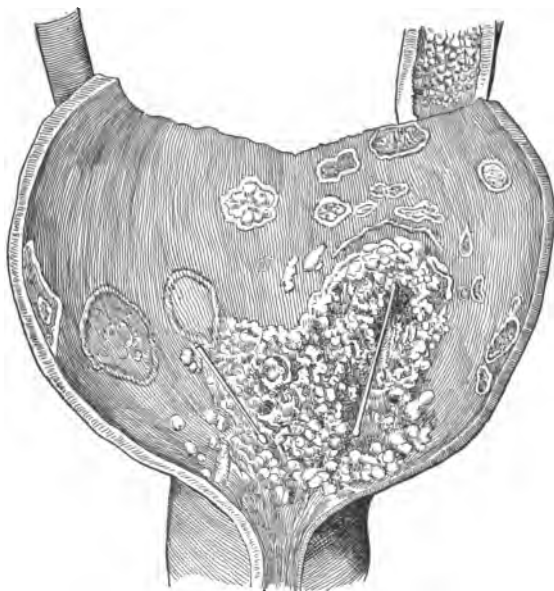


FIG. 26.—Tuberculosis of the bladder (Orth).

stone, and is rarely free blood, thus differing from that resulting from neoplasms. The blood usually appears at the end of the act, accompanied by terminal pain from spasm. The next urine passed is usually tinged with blood, and so the bleeding continues for a few hours or days, then ceases, to start after a period of several days or weeks. The urine is never actually free from blood, which may be demonstrated by the microscope. As the disease progresses, the urine be-

comes constantly hazy, and the actual hemorrhage may either not increase or become less in quantity.

The diagnosis is confirmed by finding tubercle bacilli in the urine and by cystoscopic examination.

Describe method of collecting specimen and examination for tubercle bacilli of the genito-urinary tract.

To secure the urine from either kidney, catheterize the ureter through the cystoscope and collect direct in two bottles, one for either kidney. To secure the urine from the bladder, catheterize with a sterilized catheter.

If the urine has a specific gravity above 1010, dilute with normal salt solution. Then digest it for twenty-four hours with the following fluid: commercial pepsin, 3 grains; chloroform, 10 c.c.; water, 1000 c.c.; hydrochloric acid in sufficient quantity to make 3 per cent. Now centrifuge for twenty-five minutes at the highest speed. Make a smear, air dry, and fix with glacial acetic acid. After using this method, the pus and other organic matter will have been digested and only the tubercle bacilli will remain. Another method is to collect the urine for twenty-four hours—not practical for catheterization of the ureters—in a sterile vessel. Precipitate either by centrifuge or gravity a sufficient amount of the specimen and allow to dry in an oven for six hours at 50° C. The dried cover-slip specimen is then passed through a Bunsen flame three times. Cover-slips are then ready to be stained. The carbol-fuchsin and Gabbet's solution method give excellent results, and may be described as follows:

A small portion of the specimen is smeared upon a cover-glass; another cover-glass is superimposed and the two rubbed together until the specimen is attenuated. The cover-glasses are then separated by sliding them apart, leaving two prepared cover-glasses. When dry one of them is passed three times over the flame of an alcohol lamp to fix the smear. The cover-glass is then completely covered with the staining fluid and held over the flame until the solution begins to vaporize, care being taken to keep the cover-glass completely

NOTE.—It is often necessary to make many examinations before the bacilli can be demonstrated, owing to the volume of urine in which the tubercle bacilli are found.

covered with the solution during the heating. At the end of one minute the cover-glass is washed in water. The specimen is then decolorized with acidulated alcohol (8 drops HCl to a watch-crystal full of alcohol) and examined, with a $\frac{1}{2}$ oil-immersion lens and Abbe's condenser. The specimen is more brilliant if counterstained by Gabbet's acid blue.

Carbol-fuchsin Solution.

Powdered fuchsin	1 part
Alcohol	10 parts
5 per cent. solution carbolic acid	100 "
Mix and filter.	

Gabbet's Solution.

Methylene-blue	2 parts
25 per cent. solution sulphuric acid	100 "

What is the treatment of tuberculosis of the bladder?

General treatment appropriate to tuberculosis elsewhere. Articles of diet which render the urine irritating, overdistention of the bladder, excessive fatigue, and especially chilling of the body must be avoided. The use of salol and boracic acid is appropriate. Instrumentation is likely to precipitate an acute inflammation. Cystitis being present, irrigations with corrosive sublimate, beginning with a solution 1:5000, gradually increasing to 1:1000, may be used twice weekly.

THE URETERS.

Describe the ureters.

The ureter is about 12 inches long and $\frac{1}{4}$ of an inch in diameter. It is a long cylindrical muscular canal and conveys the urine from the kidney to the bladder. It descends along the psoas muscle behind the spermatic vessels and crosses the common iliac artery at or just above its bifurcation into the pelvis. Tracing it downward, it runs along the side of the bladder external to the vas deferens and enters the bladder about $1\frac{1}{2}$ inches behind the prostate and about 2 inches from its fellow on the opposite side.

How can the ureters be examined?

The ureter can rarely be felt when in the normal state.

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When tender or enlarged, however, in a thin subject it may be traced almost from the kidney to the brim of the pelvis. In fleshy subjects it can only be felt at the latter point—viz., at the outer edge of the rectus muscle on a line joining the anterior spines of the ilia. Tenderness at this point can



FIG. 27.—Course of ureters on skin of abdomen (Kelly).

always be distinguished by palpation, and if the patient is not overfat, an enlarged ureter can be rolled between the finger and the iliac artery.

In the female pelvis the ureter is readily felt through the vaginal vault almost up to the pelvic brim.

In the male, only in exceptional cases, can tenderness or enlargement at the lower extremity of the ureter be demonstrated by rectal touch in the region just internal to the base of the seminal vesicle.



FIG. 28.—Landmarks on the skin for the transit of ureters from abdomen into pelvis (Kelly).

The cystoscope reveals the condition of the ureteral orifice, or whether pus or blood comes from the ureteral opening. The ureter can be explored with the catheter.

Describe ureteral calculus and the operation for its removal.

Ureteral calculi are caused by the descent of a calculus

from the pelvis of the kidney. They have three points of predilection—namely, at the junction of the renal pelvis and

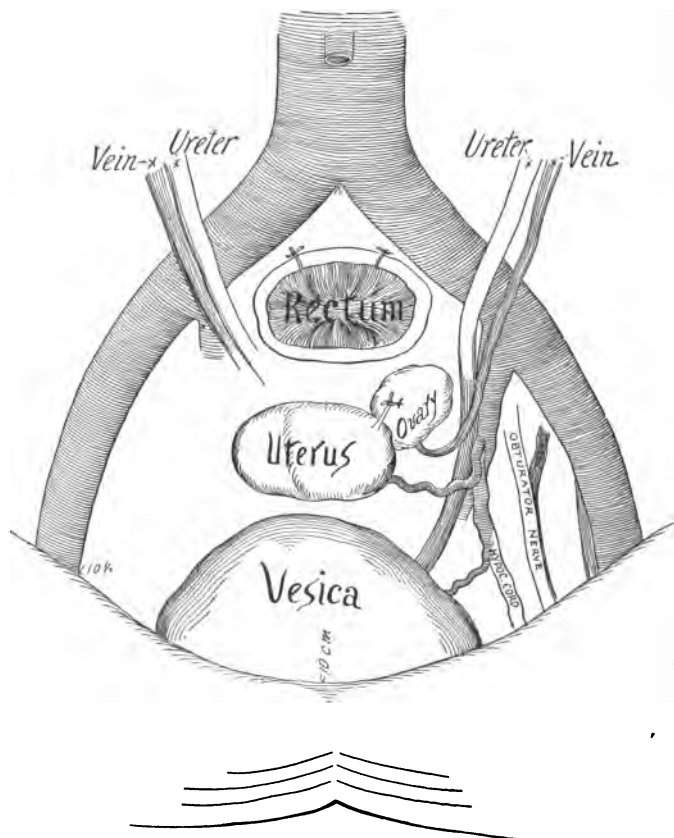


FIG. 29.—Pelvic portion of the ureter from below (Kelly).

the ureter, in the lower third of the ureter where the sacrum bends forward, and in the intravesical portion of the ureter.

The symptoms vary according as the stone partly or completely obstructs the flow of urine. In the latter instance

typical renal colic and anuria are not uncommon, whereas in the former no symptoms whatever may be produced. A calculus may remain impacted for years. If the history and

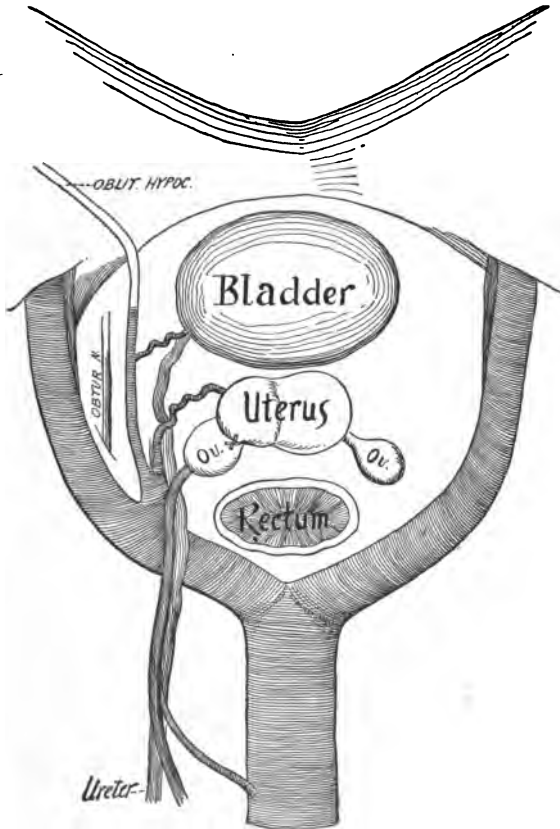


FIG. 30.—Pelvic portion of the ureter from above (Kelly).

symptoms of the case be carefully studied and the results of palpation, catheterization, and *x*-ray of the ureters be considered, a diagnosis should be reached.

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The upper portion of the ureter may be exposed by either of the two principal incisions described for exposing the kidney.

If the oblique incision be prolonged around the iliac crest, parallel with Poupart's ligament, to a point corresponding to the external abdominal ring, nearly the whole length of the ureter can be brought into view.

The abdominal portion of this incision is carried down to the peritoneum, which is then separated and displaced inward so as to expose the ureter.

A longitudinal incision is then made in the ureter, the calculus extracted, and the wound closed with catgut. In cases where the ureter is greatly distended with foul, decomposed urine and pus, drainage is to be employed.

Calculus at the brim of the pelvis may be attacked extraperitoneally through an incision in the linea semilunaris. The extraperitoneal incision is usually preferred if there is infection.

Calculus at or near the vesical orifice of the ureter may be reached in a variety of ways. If the stone bulges into the bladder it may be extracted through the bladder. Suprapubic cystotomy permits removal of the stone by divulsion or incision of the ureteral orifice and with the scoop.

When the stone lies outside the bladder, low down in the pelvis, it is extremely inaccessible. Sometimes it may be reached through a transverse perineal incision; the intraperitoneal or inguinal is preferable to other routes of access. Four points must be considered: (1) The incision in the ureter should be longitudinal; (2) before making the incision the stone should be pushed from its bed in order that the cut will be made through tissues unaffected by pressure from the stone; (3) before closing the ureteral incision the entire ureter must be explored with a long probe in search of other stone or stricture; (4) ureteral incision should be closed with fine silk or catgut, not piercing the mucous membrane. Drainage is important.

Describe ureteral neoplasms.

There are two kinds of ureteral tumors, both of which have a papillary structure; one is true papillary carcinoma, and

the other simple papilloma. The latter is so prone to degeneration that it might be said in a general way that ureteral neoplasms are all malignant.

The clinical picture is one of intermittent hematuria. Rarely fragments of the tumor may be washed to the bladder and then form in the urine.

A cystoscopic examination determines their source by excluding the bladder.

The treatment consists in complete extirpation of the kidney, with removal of as much of the ureter as is possible.

What is ureteral fistula ?

An abnormal opening in the ureter which may be congenital (rare) or acquired. Acquired fistula usually follows some operation, as abdominal section, vaginal hysterectomy, or after the removal of stone or the correction of stricture of the ureter. The discharge is usually uropurulent, sometimes simply purulent, rarely simply urinary. The presence of urine in the discharge usually indicates that the tube leads to a functioning kidney. The treatment consists in ureteral anastomosis if the kidney functionates, otherwise ureterectomy.

What are the causes of stricture and obstruction of the ureter ?

Stricture of the ureter depends upon an inflammation which has previously involved either the kidney or the bladder.

The causes of obstruction are congenital deformity, calculi, operation, kinking, or new growth. The symptoms from both are those of hydronephrosis, and the treatment is operative.

Describe the operative treatment for stricture of the ureter (Keyes).

After the oblique lumbar incision has been prolonged into the inguinal region (see Operation for Nephrotomy), the hydronephrosis is evacuated and a probe introduced into the ureter from the renal pelvis should sound the ureter until the stricture is detected. Lift up the peritoneum and follow the tube until the strictured portion is reached. At this point,

if the peritoneum is adherent, it must be torn away to free the ureter. This tear must be sutured immediately. The ureter is then brought up into the wound and the strictured portion incised longitudinally. This longitudinal incision is then sutured transversely. If the operation cannot be done (inability to free the ureter or accidental tear across the ureter, stricture too wide, or the walls above too friable), the ureter must be divided and some form of ureteral anastomosis employed. Obstructions of the second class are usually due to nephroptosis, and often the cause of intermittent hydronephrosis. The obstruction is at or near the junction of the ureter and pelvis, usually consisting of a kink surrounded by adhesions.

What is the operative treatment for obstruction of the ureter?
(Keyes.)

The indication is to secure free outflow for the urine. Kinks must be straightened and stenosis relieved.

The simplest way to accomplish this threefold purpose is to replace the prolapsed kidney. The oblique incision is made, through which the pelvis of the kidney is emptied of its contents, adhesions are broken up, and the internal orifice of the ureter palpated and inspected through the incision into the pelvis of the kidney. If the probe passes freely down the ureter, the kidney is replaced. Herein lies the cure for the condition—reposition of the prolapsed kidney. The organ should be replaced high up under the ribs. When there is difficulty in finding the internal orifice, incise and invert the hydronephrotic sac, inspecting the internal surface; or map out the ureter below, and pass a probe upward through a small longitudinal incision. If the pelvic dilatation has occurred irregularly, and after the kidney has been replaced, there is still a pouch hanging below the ureteral orifice; the pouch walls should be scarified and sutured together. When pelvic pouching and stricture are associated, lateral anastomosis of the ureter with the pelvis is indicated. This is done by suturing a longitudinal incision in the ureter below the stricture to a corresponding incision at the most dependent point of the pelvis, fine catgut being used. In spite of the many cures following plastic operations for obstruction with

hydronephrosis the old operation of simple nephrotomy and drainage holds its own for relief of this condition.

What is ureteral anastomosis ?

Establishing the flow of urine through a divided ureter.

Describe uretero-ureteral anastomosis (Poggi ; Bovée ; Van Hook).

This may be done in three ways—end-in-end anastomosis, oblique end-to-end anastomosis, and lateral anastomosis. In

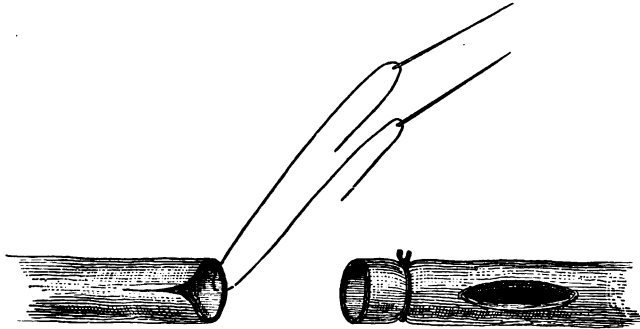


FIG. 31.—Uretero-ureterostomy. The needles have been introduced into the wall of the renal portion of the ureter. The end of the vesical portion of the tube has been ligated and a slit made in its wall (Van Hook).

the end-in-end anastomosis the upper end of the severed ureter is cut obliquely (to prevent stricture) and the lower end dilated.

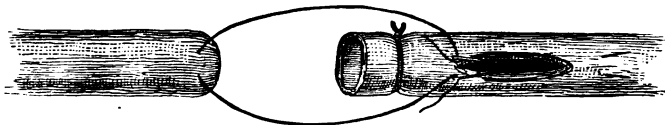


FIG. 32.—The needles carrying the traction suture attached to the renal portion of the ureter have been passed into the slit in the wall of the vesical portion, carried down a short distance, and pushed out through the wall (Van Hook).

The upper end is then drawn into the lower by a single suture, the longitudinal incision closed by Lembert sutures of fine

silk, and the union strengthened by a circle of silk Lembert sutures, surrounding the external line of the joint. In the oblique end-to-end anastomosis both ends are cut obliquely, dilated, and sutured with rectangular and simple interrupted sutures of silk, traversing only the outer coats of the duct and reinforced by a few Lembert sutures. In lateral anastomosis the lower end of the severed tube is ligated about one-fourth of an inch from its free end. One-fourth of an inch below the ligation incise the tube longitudinally. The opening must be twice as long as the diameter of the tube. Split the other end of the ureter for one-fourth of an inch from its free end; this secures patency. Pass two very small cambric needles, armed with one thread of catgut, through the wall

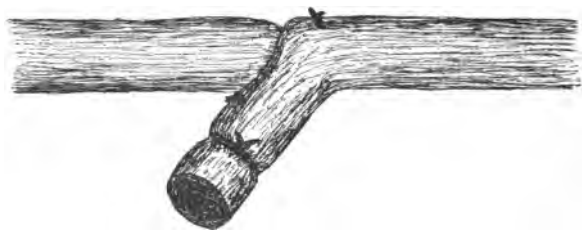


FIG. 33.—By means of the traction suture the renal portion of the ureter has been implanted into the vesical portion. The ends of the traction suture have been tied together (Van Hook).

of the upper end of the ureter one-eighth of an inch from the extremity from within out, the needles being from one-tenth to one-eighth of an inch apart and equidistant from the end of the tube. The loop thus formed secures anchorage for drawing the upper end of the ureter into the slit made in the lower end. The needles are passed through the slit in the lower end of the ureter into and down the tube for one-half of an inch, where they are pushed through the wall side by side. Now draw upon the catgut until the upper end of the ureter is drawn into the slit of the lower end. When this is done, tie off the catgut. A circle of catgut Lembert sutures may be used to reinforce union and hold the walls in position. The joined ureter should be finally enveloped with peritoneum.

Describe cysto-ureterotresis.

Cysto-ureterotresis (ureterocystoneostomy), or the anastomosis of the ureter with the bladder, is done as follows :

Through the lumbo-inguinal incision (see Nephrectomy) elevate the peritoneum until the bladder, distended with boracic acid solution, is exposed. The ureter is freed from the peritoneum and drawn down. The bladder is now emptied, by catheter and incised on the point of a small sound, at the most convenient point, as near as possible to the trigone. The end of the ureter is slit to prevent stenosis, and the tube is then drawn down into the incision in the bladder and stitched. If the ureter seems too much on the stretch, or too short, some distance may be gained by loosening the pubic attachments of the bladder and suturing the fundus to the lateral pelvic walls.

Describe entero-ureterotresis.

This operation, or the implantation of one or both ureters, into the bowel (the rectum or the sigmoid flexure) is followed by early results that are encouraging ; but ascending infection nearly always follows ; as the patient grows older complications from stenosis of the field of operation render the procedure hazardous. For description of operation, see Maydl's Operation (Keyes), as described for diverting the urinary stream in complete epispadias.

What is ureterectomy ?

Excision of the ureter. It may be done in the following way (White and Martin) : With the patient lying on his side the oblique lumbo-ilio-inguinal incision is made (see Nephrectomy) and carried down as far as need be, even to the external abdominal ring. When the peritoneum is reached it is carefully lifted up and the ureter looked for. If the operation is done with nephrectomy, the ureter is usually easily traced down ; if, however, the ureterectomy is secondary it is better to search for the duct where it crosses the brim of the pelvis. The peritoneum is lifted and the finger feels for and recognizes by their pulsations the internal and external iliac arteries.

Opposite the junction of these, closely confined to the peritoneum by its sheath, the ureter will be frequently found. The sheath is nicked and an aneurism needle passed under the ureter, after which the dissection is easy. The ureter should be dissected to its bladder insertion, where it may be tied off and cut between ligatures. The external wound is closed in layers and proper drainage established.

THE KIDNEYS.

What is the gross anatomy of the kidneys?

The kidney is ovoid in shape, flattened anteroposteriorly and with a deep notch—the hilum—in its inner border. The renal vessels and nerves enter the kidney through the hilum, the vein lying in front of the artery, while behind there is the conical pelvis terminating below in the ureter. The central cavity is called the sinus and is lined by a prolongation of the fibrous coat of the kidney which enters through the hilum.

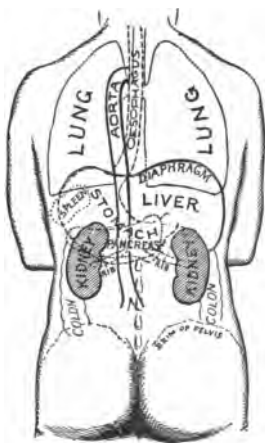


FIG. 34.—Diagram of the relations of kidney to viscera, spine, and surface points (*American Text-Book of Surgery*).

The kidney is about 4 inches long, $2\frac{1}{2}$ inches wide, and a little over 1 inch thick, and weighs $4\frac{1}{2}$ to 6 ounces. The kidney is closely surrounded by a fibrous capsule sending fine processes between the secreting tubules. A thin, irregular layer of unstriped muscle lies between the capsule and the kidney. When the organ is healthy the capsule is easily stripped, but chronic inflammation causes the capsule to adhere firmly.

A vertical section shows the secreting structure of the kidney to consist of two parts—an outer or cortical portion and an inner or medullary portion, the latter made up of rounded cones (pyramids) whose apices (papillæ mammillæ) project into the

sinus of the kidney; while between the medullary pyramids the lighter colored cortical portion of the organ also abuts on the sinus.

The renal arteries are given off from each side of the abdominal aorta and proceed directly outward to the kidney, lying behind the renal veins (the right renal artery running behind the inferior vena cava). As the artery enters the hilum of the kidney it divides into several branches, which

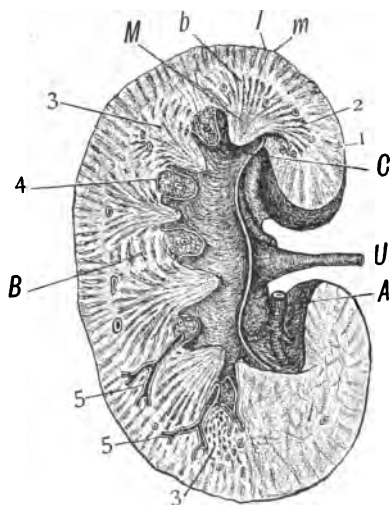


FIG. 35.—Kidney, longitudinal section, exhibiting general relations of microscopic details (after Piersol): *A*, Renal artery; *U*, ureter; *C*, one of the calyces, into which a papilla projects; 1, cortex containing labyrinth (*l*) and medullary rays (*m*); 2, medulla; *M*, Malpighian pyramids, some obliquely cut at 3; 3: *b*, boundary layer; *B*, columns of Bertini; 4, masses of adipose tissue; 5, 5, branches of renal artery (after Henle).

enter the cortical substance and are thence distributed through the organ.

The renal veins accompany the arteries, lying in front of them, and empty into the vena cava. On the left side the spermatic, inferior phrenic, and suprarenal veins are tributaries of the renal. The nerves are derived through the

renal plexus, from the solar plexus, the semilunar ganglion, and the lesser and smaller splanchnic nerves. The spermatic plexus is derived from the renal plexus. The lymphatics accompany the blood-vessels and empty into the lumbar glands.

The kidneys lie on each side of the spine in the upper lumbar region behind the other viscera and outside the peritoneal cavity. They rest on the diaphragm and psoas magnus and quadratus lumborum muscles, between the twelfth dorsal and the third lumbar vertebræ. The upper extremities lie nearer to each other than the lower, and the internal borders face a little downward and forward, the outer border upward and backward. The right kidney lies lower than the left, on account of the position of the liver above.

The kidney, surrounded by its capsule and capped by the adrenal, lies embedded in a mass of loose cellular tissue usually containing a quantity of fat and calculated to permit slight changes in its position and size. The fat (perineal fat) quite fills the hollow of the loin and is surrounded and held in place by a distinct fascia.

Behind, the kidney is in relation with the diaphragm and the psoas and quadratus muscles. The last dorsal nerve runs transversely between the muscles and the perineal fascia, and the pleura usually descends between the ribs and the diaphragm low enough to cover the upper third of the organ. The right kidney is covered in front by the right lobe of liver, peritoneum intervening, the descending portion of the duodenum, and the beginning of the transverse colon.

The left kidney has in front the fundus of the stomach, the tail of the pancreas, and the descending colon (upper part).

What is the pelvis of the kidney?

The pelvis of the kidney is the dilated upper extremity of the ureter within the kidney. At the base of the renal pyramids the epithelium of the uriniferous tubules joins with the fibrous covering of the cortex, the one to form the inner, the other the outer coat of a dilatation including one or more papillæ and called a calyx (infundibulum). The calices unite to form the pelvis, an irregularly funnel-shaped pouch

which protrudes from the lower and back part of the hilum, whence it runs downward, narrowing rapidly to become the ureter proper at a level with the lower end of the kidney.

What is the effect of anesthesia upon the kidneys?

Albumin and casts appear in the urine after anesthesia, but this is transitory if the kidneys are normal. If the kidneys are diseased, chloroform is the preferable anesthetic, unless, as is common in advanced kidney disease, there is also a myocarditis. In the latter case ether may be the less dangerous. The choice must be made between chloroform, which may paralyze the inflamed heart muscles, and ether, which contracts the arterioles of the kidneys.

The A. C. E. mixture involves both dangers.

How may the kidneys be examined?

Inspection reveals nothing unless the organ is so enlarged that from its fixed point against the spinal muscles it bulges so as to change the contour of one side of the abdomen. Palpation is practised with the patient upon his back at the edge of the bed in the attitude which relaxes the muscles of the abdomen. To examine the right kidney the surgeon makes pressure with the index and middle finger upon the triangular depressible spot between the last rib and the vertebral column. The right hand is then placed close under the free border of the rib and firmly pressed upward and inward while the patient takes a very deep breath. At the time of the deep inspiration the fingers of the left hand are quickly pressed forward. If the kidney is tender, this will give pain; if enlarged or displaced, the organ will be felt by the right hand.

What are the abnormalities of the kidney?

Unimportant congenital malformations are common. There may be one or several kidneys, and two kidneys may be fused or one atrophied.

What is mobile kidney?

A mobile kidney is one which is abnormally situated and unduly movable.

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The degree of mobility is variable; in some cases the kidney may be displaced only a short distance, while in others it may be freely moved upward under the costal arch or downward apparently as far as the small pelvis.

Movable kidney may be congenital, although it is more frequently acquired. It is more common on the right side than on the left, and affects women oftener than men.

A dislocated kidney is a previously movable kidney which has become abnormally anchored in consequence of inflammatory adhesions.

In a large number of cases movable kidney does not give rise to any symptoms.

In the minority of cases the pronounced symptoms are nervous disturbances, caused by pressure and traction upon the nerves of the kidney. Neuralgic pains radiate to the sacrum, back, and groin, and are increased by bodily exertion. Digestive disturbances are also marked, such as anorexia, nausea, vomiting, constipation, and distention of the abdomen.

Disturbances of micturition may be present, and there may be occasional renal colic. The diagnosis may be confirmed by palpation.

What is the treatment for nephroptosis?

Palliative: Improvement of the general health and the use of an abdominal supporter.

Radical: Anchor the kidney (Nephropexy).

Describe nephropexy.

The patient is placed on the sound side, a sand-bag pillow under the loin. The incision is made an inch below the last rib and close to the outer border of the erector spinæ muscle, and runs obliquely downward and forward toward the iliac crest for three inches, the incision being enlarged if required.

Divide the skin, the superficial fascia, the fat, the external oblique, the posterior border of the internal oblique, and the outer edge of the latissimus dorsi. The incision exposes the lumbar fascia. Push aside the last dorsal nerve and incise the lumbar fascia, when the fat will bulge into the wound. Two distinct layers of fat exist; tear this fat through to ex-

pose the kidney. An assistant, with his fist pressing on the belly, pushes the kidney up into the loin. Pass a curved needle, armed with a thick suture, through the muscles and fascia of the back which forms the outer edge of the wound, through the remnants of the fatty capsule and into the kidney parenchyma near the outer convex border of the kidney. The needle penetrates the kidney to the depth of about $\frac{1}{2}$ inch and emerges at a point about $\frac{3}{4}$ inch internal to its point of entrance. After emerging from the kidney the needle passes through the remnants of the fatty capsule and the muscles and fascia of the back which form the inner edge of the wound. Three such sutures are put in place, one at the upper end of the kidney, one at the lower, and one in the middle; but none of them are tied. The deep parts of the wound in the back are now approximated by buried sutures. When this is done the three sutures which pass through the kidney are carefully tied, without pulling, so as to avoid tearing them out of the kidney. The superficial wound is closed.

What injuries may occur to the kidneys?

Contusions, with or without rupture. The kidneys rarely suffer from trauma, but may be bruised or burst from direct violence, the lower rib being broken. Bruises causing subcapsular hemorrhage are exceedingly painful. Recovery usually occurs when the blood is evacuated.

If there is extensive laceration of the kidney, blood and urine soon form a tumor in the loin which may result in general subperitoneal infiltration. In other cases blood passes by way of the bladder. Slight injuries of the renal parenchyma take care of themselves. Slight injury to the kidney is attended by shock which seems disproportionately great, and severe injuries are followed by gangrene or the burrowing of pus and urine, and usually death from toxemia.

What are the cardinal symptoms of rupture of the kidney?

Shock, hematuria, variation in the quantity of urine excreted, tumor, and pain. The first evidence of this condition is likely to be hematuria, although there may be rupture without it, owing to a blood-clot in the ureter or rupture of that canal.

What is the character of the bleeding ?

It is rarely constant. The urine may contain more or less blood for weeks.

Exceptionally, bleeding may not be appreciable for several days after the injury.

Describe the variations in the urine after injury.

The effect of shock is to lessen the amount (oliguria) or to prevent entirely the formation of urine (anuria) during twenty-four hours. If anuria continues, the necessity for nephrotomy is absolute. After the urinary flow is established there is compensatory polyuria.

Describe the tumor resulting from rupture of the kidney.

If the extravasated blood and urine form a palpable tumor it is found in the loin of the affected side. It may be several days in developing. It is usually quite large and may be apparent in the groin. The tumor is elastic without appreciable fluctuation.

Describe the pain of ruptured kidney.

Pain does not necessarily follow rupture of the kidney. The superficial, slight contusions produce local pain and tenderness. A blood-clot may bring on a pain like that of renal colic.

What is the treatment for rupture of the kidney ?

Shock is so severe that treatment must be immediate. The patient should be put to bed and surrounded with hot bottles.

Strychnia and nitroglycerin should be given hypodermically. Medicine or food at this time is likely to incite vomiting. Morphia should be injected for pain, but it should be used sparingly for fear of masking the symptoms. The catheter should be employed with the most minute antiseptic precautions, for the bloody urine in the bladder is unusually receptive to infection. The administration of normal salt solution may be called for.

Immediate operation is called for only when the patient fails to rally from his shock or when there is evidence of grave internal injury associated with little shock. After the first shock is over the expectant treatment may be continued,

provided the patient grows progressively stronger. The surgeon should be prepared to operate, however, at the first unfavorable symptom.

The usual indication for operation at this time is continued hemorrhage, as shown by the growing tumor in the loin. Anuria, persisting for twenty-four hours, is another indication for operation. Beginning sepsis, as shown by unfavorable temperature and pulse, also indicates surgical intervention.

The surgeon employs the incision with which he is familiar. Upon incision of the fascial envelope, clots, blood, bloody urine, or pus exudes and should be wiped away. If copious bleeding is encountered, the renal artery must be clamped and tied, though, as a rule, the hemorrhage may be controlled by suture of the kidney and packing. Provide for ample drainage by gauze packing. Secondary nephrectomy may be required if prolonged suppuration ensues. (See Nephrectomy.)

What is perinephritic extravasation ?

The penetration of urine or blood into the perirenal tissue.

If blood alone is extravasated, as is the case when the pelvis of the kidney is not torn, a tumor forms quickly, remains aseptic, and may be finally absorbed. If the pelvis is affected, urine is added to the tumor, and it inevitably suppurates. The tumor from urine alone forms slowly ; the swelling appears in the loin, perhaps later extending downward to the inguinal region.

What is the treatment of perinephritic extravasation ?

Exploratory incision should be made in all cases. An outlet for the urine must be made and free drainage established. If sepsis supervenes, nephrectomy may be necessary.

What is perinephritis ?

An inflammation of the fibrous capsule of the kidney. The prominent symptom is pain. The word perinephritis is now used to cover inflammation of the fatty envelope as well. The inflammation usually results in the formation of many small subcapsular areas of suppuration, which finally coalesce, forming one or more large abscesses.

If the flow of urine from the pelvis of the kidney is obstructed, the case becomes one of pyonephrosis with its attendant dangers.

What are the symptoms of perinephritis ?

If the fibrous envelope be inflamed there is acute pain resembling renal colic. Minute abscesses cause little pain, but the larger ones, formed by coalescence, cause severe pain and the evidences of toxemia—irregular chills, fever, and sweating. The prognosis of such a case is grave.

When suppurative nephritis that is not gonococcic occurs, it develops slowly ; there may be repeated chills, mild fever, and loss of strength and weight ; then pain develops in the kidney. Pus may or may not appear in the urine, and a tumor of the kidney may or may not be discoverable.

What is the treatment of suppurative nephritis ?

Free incisions into the phlegmonous area should be made and drainage established through the loin. If the kidney is involved, it should be incised and drained. If it is found to be mostly destroyed, it should be removed.

What is hydronephrosis ?

Distention of the pelvis of the kidney from obstruction to the flow of the urine. The obstruction may be at any point in the urinary tract, but it occurs oftenest at the initial end of the ureter. The hydronephrosis may be permanent or it may be intermittent, the urine at times escaping, usually into the bladder. It may be partial, one or more calices being affected by stone or cicatrix ; or total, as when the ureter is blocked by a calculus, blood-clot, coherent pus, or necrotic slough. The result of permanent hydronephrosis is atrophy of the kidney which follows the damming back of the urine. In incomplete or intermittent obstruction, some urine escapes, affording partial relief. In such conditions the kidney does not atrophy, but a general dilatation of its cavity results.

Obstruction from stricture of the urethra and hypertrophy of the prostate is responsible for more than one-fourth of all cases of hydronephrosis.

Stone, blood-clot in the ureter, and kinking of that tube are the commoner causes of obstruction. Pressure, tumors, or adherent renal vessels may be its source. Obstruction from kinked ureter is likely to be intermittent,

The tumor of hydronephrosis may involve only part of the kidney, but usually the sac wall consists of renal pelvis and capsule. The kidney becomes an irregularly lobulated tumor.



FIG. 36.—Hydronephrosis: First stage (Le Dentu).

What are the symptoms of hydronephrosis?

Cases of partial obstruction may exist without symptoms until the tumor is palpable. The tumor is smooth, rounded, fluctuating, and extends into the abdomen behind the colon. In intermittent hydronephrosis there are attacks of pain resembling kidney colic, and often after several such seizures the tumor disappears and there is an excessive discharge of urine.

The patient grows anemic, and ultimately the intermittent variety may become constant from fixed obstruction.

In the permanent variety there is history of pain and soreness about the kidney and of a tumor which has developed slowly. In neither form is there marked systemic disturb-

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ance and there is no fever. The prognosis is favorable if but one kidney is affected, and grave indeed if both are involved.

What is the treatment of hydronephrosis?

Internal medication is valueless. Manipulation and massage of the tumor, which should be gentle, may remove an impacted calculus or straighten a kink in the ureter caused by a floating kidney. Ureteral catheterization may relieve a stricture or valve formation in the ureter. The ureter may be exposed and operative intervention instituted to relieve the obstruction. Aspiration may be advisable for temporary relief. If there is no discoloration or prominence to suggest some other site, the point of election for aspiration on the right side is half-way between the last rib and the crest of the ilium, on the left side 1 inch in front of the last intercostal space. Nephrotomy and anchoring the kidney may be called for. The excision of a very large hydronephrotic kidney may be indicated. This operation is greatly facilitated by getting down to the capsule proper. This is accomplished by cutting the tissues layer by layer, each layer being raised by forceps before being cut, and the cut being made between the two forceps. Having reached the capsule, clear as large an area of its surface as possible without excavating its contents. The contents of the tumor should be emptied by means of a trochar and canula. The canula should be provided with a long rubber tube to drain away the fluid without soiling the wound. When the tumor has collapsed, withdraw the canula and clamp the opening with forceps. Pull the now flaccid tumor wall out of the lumbar wound, separating adhesions with the finger. In the dissection, especially near the region of the hilus, avoid tearing the pedicle; vena cava or other veins are easily ruptured.

Describe cysts of the kidney.

There are three varieties: simple, multilocular, and hydatid.

Simple cysts are due to constriction of the renal tubules and vary widely in number and in size. Cysts occur after middle age and are usually bilateral. The high per cent. of albumin differentiates the fluid in the cyst from that of a hydronephrosis.

In multilocular cysts there is a tumor in which fluctuation is indistinct ; unless the cysts attain considerable size they are not dangerous.

What is the treatment of simple cysts of the kidney ?

There is no satisfactory surgical treatment, as cystic degeneration is usually bilateral. Punctured cysts refill and drainage results in fistula.

What are hydatid cysts of the kidney ?

Echinococcus cysts. The kidney furnishes about 5 per cent. of the cases of this rare disease. They begin in the cortex and develop slowly, giving rise to no symptoms until quite large. Positive diagnosis depends upon finding the hooklets of the echinococcus in the urine or aspirated fluid. Neglected, these tumors burst into the pelvis of the kidney, their contents passing with the urine.

Treatment by incision and drainage is usually successful.

What are the benign tumors of the kidney ?

Fibroma and lipoma of the body of the kidney and papilloma of the pelvis. Fibroma is common while the others are rare. They seldom demand interference.

What are the malignant tumors of the kidney ?

Carcinoma and sarcoma. They give rise to intermittent pain in the neighborhood of the kidney, which at times resembles renal colic.

Hematuria occurs at some time in about half the cases, and may be slight or dangerously severe.

If hemorrhage occurs microscopic examination may be made of fragments of the neoplasm from the urine.

The cancerous cachexia and loss of flesh are noticeable, and the tumor may be palpable.

What is the treatment of malignant tumor of the kidney ?

Surgical ; lumbar nephrectomy, with removal of the upper portion of the ureter.

What are the surgical inflammations of the kidney ?

Inflammations of microbic origin which begin in the pelvis

of the kidney. They are catarrhal and suppurative pyelonephritis (often described as subdivisions of pyelitis); pyonephrosis and abscess. Pyogenic bacteria are always present. The bacillus coli joins this class when there is inflammation of the digestive tract.

The invasion of the kidney may be ascending, coming from the bladder, prostate, or urethra by bacterial invasion, or descending when the microbes come from the general circulation. Pyelonephritis is likely to be taken for chronic interstitial nephritis with an accompanying cystitis.

What are the chief predisposing causes of pyelonephritis?

Catarrhal pyelonephritis often results from ureteral reten-

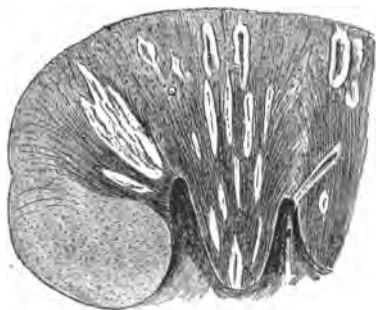


FIG. 37.—Pyelonephritis, showing lines of ascending suppuration (Kaufmann).

tion; the suppurative variety from calculus, tuberculosis, or malignant growths. Pyelitis, whether catarrhal or suppurative, does not occur without the parenchyma of the kidney being involved.

Describe acute catarrhal pyelonephritis.

There may be a chill with a sharp rise of temperature. The symptoms are transitory, there being little evidence of septicemia, except headache. The urine is very acid, and contains bacteria, albumin, and casts. Resolution may occur or the case may become one of suppurative pyelonephritis.

What are the symptoms of chronic pyelonephritis ?

Indigestion, constipation, acid bacteriuria, and toxemia, usually the result of cystitis following stricture or prostatic hypertrophy. Progressive sclerosis finally establishes an interstitial nephritis followed by a slight albuminuria and consequent cardiac hypertrophy.

The diagnosis depends upon the chemic and microscopic examination of the urine.

What are the symptoms of suppurative pyelonephritis ?

A chill is followed by high fever and evidences of sepsis. There are pain and tenderness on pressure over the kidney. Pyemia may not supervene because the pus is pent up.

The patient may die from the septicemia, or the abscess may break and discharge by way of the ureter and bladder. If this occurs the tumor is diminished in size and septic symptoms are relieved. The suppurating cavity is likely to refill and the trouble becomes chronic.

What are the symptoms of chronic suppurative pyelonephritis ?

Septicemia, pyuria, pain, tenderness, and swelling of the kidney are present, their severity depending upon the freedom with which the pus drains. The symptoms become acute if the pus is so pent up as to disappear from the urine. In some cases the periods of intermittence are less marked because drainage is always incomplete.

Describe pyonephrosis.

The result of blocking of the ureter during a pyelonephritis or the entrance of pyogenic organisms into a hydronephrosis. Blocking of the ureter gives rise to acute paroxysmal pain and increases tenderness. Suppuration beginning in a hydronephrotic sac is followed by chill and high fever and the evidences of infection.

If any urine comes from the affected kidney it shows pus and bacteria.

Describe abscess of the kidney.

Abscess of the kidney is suppuration of the substance of

that organ, the result of germs from the general circulation. It occurs in pyemia and other acute constitutional diseases and from embolism, and may become chronic and riddle the kidney. The renal pelvis is not involved in the inflammation unless an abscess bursts into it. Renal abscess is usually unilateral. The symptoms are those of pus absorption, and the prognosis is bad, but operative intervention has saved many patients.

What is the treatment of surgical inflammations of the kidney ?

In catarrhal pyelonephritis the stricture, hypertrophied prostate, pelvic tumor, or peritoneal adhesions should be removed in the interest of drainage.

In ascending suppurative pyelonephritis drainage must be established through the urethra or by nephrotomy.

In pyonephrosis nephrotomy is necessary, as well as the operative correction of the obstruction which is its cause. A lumbar fistula from the nephrotomy may require an operation to close it after drainage is established through the urinary tract. In abscess of the kidney the choice between nephrotomy and nephrectomy should be made after the organ has been exposed.

Operation is futile in abscess from pyemia.

Describe renal and ureteral calculus.

A urinary calculus is a stone-like body made up of crystalline urinary salts, gathered in laminæ by organic matter around a nucleus. Two-thirds of all calculi are made up chiefly of uric acid. Oxalate of calcium stone is next in frequency. Both are built in acid urine. Phosphatic stones which are made in alkaline urine are less frequent, and stones in which cystin, xanthin, or ammonium urate predominate are very rare. The nucleus of a stone is a uric acid crystal, a bit of epithelium, a blood-clot, or other foreign body. In the kidneys there may be one stone or a great number. Calculi often have fantastic shapes. Stone is an accident of middle life.

How are renal calculi likely to cause trouble ?

A calculus formed in the renal pelvis may at any time be

carried into the ureter, obstructing it partially or completely. The points of lodgment, named in order of frequency, are the renal end of the ureter, its vesical end, and at the edge of the pelvic brim.

What is renal colic ?

The terrific paroxysm of pain incident to the lodging of the calculus in the ureter. Urine pressing in the tube behind the stone may push it onward into the bladder, or, by dilating the tube behind it, cause it to slip back into the pelvis of the kidney. The ureter may adapt itself to the presence of the foreign body. If the stone does not completely obstruct the ureter, hydronephrosis is likely to follow. If the obstruction is complete, the kidney becomes acutely congested and ultimately atrophies. A large stone impacted may cause ulceration and perforation of the ureter and the formation of a pus cavity.

What are the symptoms of renal and ureteral calculi ?

Pains dart down the ureter to the testicle and head of the penis, the testicle being drawn up. There is usually an incessant desire to urinate, although there is almost absolute suppression. What little urine there may be passed is tinged with blood. The pain comes in paroxysms. During the intervals there is relief, except a sensation of pressure in the region of the trouble. The pain may be so severe that the patient vomits and faints. The skin is bathed in a cold sweat.

Palpation may show a point of tenderness over the location of the stone. The pain from a fixed stone in the ureter is a dull, continuous ache. Kidney colic often occurs in persons



FIG. 38.—Dilatation of the ureter due to calculous obstruction (Stengel).

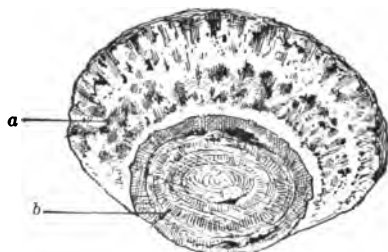


FIG. 39.—Uric acid calculus; the lower half was embedded in a sacculus; the upper half, being exposed to the urine, became coated with phosphates: *a*, Phosphatic exterior; *b*, uric acid (Clarke).

who are apparently healthy. Stones which have given rise to no symptoms are sometimes found at autopsies.

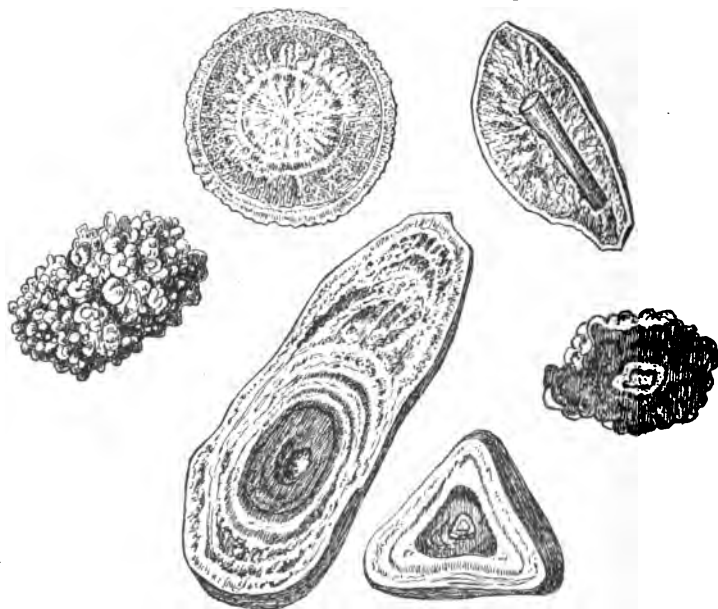


FIG. 40.—Urinary calculi, showing the nuclei from which they originate, the concentric laminae by which they are formed, the radiating infiltration sometimes observed, and the various smooth and nodular surfaces (Orth).

What is calculus anuria?

Absence of urine because of renal stone. It is almost invariably from a bilateral obstruction. There may be pain in one kidney as a prodrome, then anuria, to which, if not relieved, are added hiccough, vomiting, and evidence of uremia.

What is the treatment of calculus anuria?

If the energetic use of diuretics does not dislodge the stone and establish the flow from the ureter within two days, the calculus should be located with the radiograph and removed. Long delay is unpardonable and the prognosis is grave at best.

What is the treatment of renal colic?

Morphin hypodermically in sufficient quantity and frequency to control pain. Hot applications, and in severe cases chloroform, should be used to relax spasm. The ureteral catheter is sometimes used, during anesthesia, with the object of returning the stone to the pelvis of the kidney. Following an attack of colic the urine should be searched for the calculus. If pain persists, the stone is impacted and nephrotomy should be done without delay. An impacted calculus grows by phosphatic deposit. If the pain suddenly ceases, showing that the stone has passed, it is well to have a radiograph made to see if there are others in the kidney which are too large to be extruded. If such there be, operation should be made before urgent symptoms demand it.

What is the treatment of suppuration due to renal calculus?

Pyonephrosis and perinephritic abscess from any cause should be operated upon as soon as consent can be gained.

Describe nephrolithotomy.

Expose and, if possible, deliver the kidney as in nephrotomy. Control the renal circulation by finger pressure at the hilus or by the elastic constrictor. Incise the kidney as in nephrotomy. If the stone is small and lies free in the pelvis, pass a forceps through the renal wound and extract it. When the stone is large and fills the renal calices, its extraction is difficult. Under such circumstances enlarge the incision

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through the kidney to the necessary extent. With the finger pull the stone out of the calices and remove it unbroken. If its removal entire is impossible, fracture it with forceps. Remove all fragments and débris with fingers, spoon forceps, gauze strips, or douche. When several calculi are present, they may often be extracted through the same renal wound, but, if necessary, they may be removed through separate incisions. The calculi having been removed, introduce and fix drains in the renal wounds. Close the nephrotomy wound with catgut. Close the lumbar wound except where the drains emerge.

Describe nephrotomy.

Nephrotomy may be performed through a transverse or an oblique incision for nephropexy (fixation of floating kidney); exploratory nephrotomy or nephrolithotomy may be employed, but inasmuch as exploration of the renal pelvis and ureter may be necessary an incision which may be prolonged toward the pelvis is useful. For this purpose the oblique or curved lumbo-inguinal incision is always practical. The extremity of the last rib is outlined by the finger. The incision is begun a finger's-breadth below and in front of its tip, carried obliquely downward and forward to within two-fingers'-breadth of the highest point of the crest of the ilium. The line may be nearly straight or curved, its convexity backward. The skin and superficial fascia are incised, exposing the external oblique muscle. This is divided in the line of its fibers. The internal oblique is then divided transversely, and the transversalis may be pulled forward and out of the way. If necessary, the last dorsal nerve and vessels may be sacrificed. At this point in the operation, pressure of the posterior flap backward exposes the thick rounded border of the quadratus lumborum muscle, while the bottom of the wound is closed by the glistening lumbar fascia. This is incised vertically, and immediately the perinephritic fascia presents itself. This structure resembles the subperitoneal fascia so closely as to be mistaken for it. The guide is the border of the quadratus lumborum; the fascia underlying this is never peritoneal. Incision of the perinephritic fascia

permits the protrusion of the fatty capsule. The incision is enlarged with the finger, and by blunt dissection the fat is separated until the kidney is exposed, which can be usually felt high up under the ribs. Exceptionally the fatty capsule is so condensed by a fibrolipomatous inflammation that it has to be incised. Ordinarily it is easily separated. The remainder of the operation consists in liberation of the kidney sufficiently for its protrusion through the lumbar incision. This is done by inserting the fingers behind the kidney, sweeping them around the lower pole, then around the upper, and finally across the front of the organ, thus freeing it from its capsular attachments. This manipulation can be greatly aided by fist pressure on the anterior abdominal wall.

Describe pyelotomy.

It is good surgery either to open the pelvis of the kidney or incise the organ itself, whichever presents in the field of operation or affords the most appropriate access to the trouble in the kidney. The incision in the parenchyma should always be made alongside the convex border, avoiding both tips. The splitting of the kidney in two halves, while often done, should be avoided if a lesser incision will suffice. A very good incision is in the lower third of the border. The incision of pyelotomy should radiate from the ureteral orifice toward the kidney tissue, in order that its edges shall naturally fall together when the kidney is allowed to relapse in place. Avoid wounding the renal artery and nerve. They subdivide into several branches and, running across the front of the pelvis, almost cover it. The operation is not complete until a probe is passed to ascertain the condition of the entire ureter. Finally the wound is irrigated preparatory to closure. The incision into the parenchyma is closed by one or two deep sutures of gut. The incision of the pelvis of the kidney is closed with No. 0 catgut, the suture not to include the mucous membrane.

When the kidney is suppurating, a drainage-tube may be inserted into the pelvis, protruding from the upper angle of the external wound, the lower angle being sutured. The tube may be tightly packed around with gauze.

Describe nephrectomy.

Removal of the kidney should never be performed unless it is known that the other kidney is functioning properly. Never remove the wrong kidney.

Ureteral catheterization may be employed to confirm the diagnosis as to which kidney is diseased and the condition of the other kidney. Nephrotomy may be done as a diagnostic measure, separating the urine flow. The unoperated kidney will discharge through the bladder, the urine from the operated kidney coming from the lumbar incision.

Nephrectomy may be lumbar or abdominal.

Describe lumbar nephrectomy for malignant disease.

Expose the kidney freely by the oblique lumbar incision for nephrotomy. With finger dissection separate the kidney from its surroundings until it is left attached by its pedicle alone. If the organ has become firmly adherent to its surroundings, it may be easier to separate the kidney from its fibrous capsule (*capsula propria*) than from the fatty capsule. In such a case the fibrous capsule may be left to be treated at a later stage of the operation. Next, the pedicle is examined. The vessels and ureter recognized, a ligature carrier is passed between the ureter and the vessels and tied tightly at as great a distance from the kidney as possible. This is to permit division of the pedicle far enough away from the ligature to leave a stem of length sufficient to prevent all danger of the ligature slipping. The other ligature is tied around the ureter; a hemostatic forceps is applied to the pedicle between the ligatures and the kidney. The pedicle is divided close to the kidney, leaving the hemostat attached to the stump. The hemostat gives one control of the stump and is left in position until the condition of the stump has been reviewed and it is evident that the ligature controls the vessels and is in no danger of slipping. After this the forceps are removed. Next, make a careful and complete excision of the fatty capsule of the kidney. The excision is made partly by blunt dissection, partly by cutting with scissors. All firm strands of tissue in which vessels may be hidden should be divided between ligatures or forceps. There must

be no rough tearing. The location of the inferior vena cava should be borne in mind. Next, with retractors, expose to sight the whole retroperitoneal cavity. All hemorrhage is attended to, and any tears which may have been made through the peritoneum are closed by suture.

Lastly, dry the cavity. Provide drainage either by means of gauze packing or by tube. Close the lumbar wound. Unless the wound is infected the drainage may be removed after two days. If the tumor to be removed is very large, it is often wise to seize the pedicle and any adhesions with forceps and attend to the ligatures after the tumor is out of the way.

Describe lumbar nephrectomy for non-malignant disease.

Expose the kidney by the oblique lumbar incision for nephrotomy. If the kidney is not too adherent (as a result of old inflammation) to its surroundings, the whole organ can be shelled out of its bed by finger dissection. A pedicle needle is passed between the vessels and the ureter as they enter or leave the hilus; a double ligature is pulled through as the needle is withdrawn. One ligature is tied tightly around the vessels as already described. The ligature intended for the ureter is not yet tied. The ureter is grasped by forceps. The pedicle is divided, leaving a sufficiently long stump, and the kidney is removed. The ureter is now examined. If it is clean and safe, the ligature provided for it may be tied and the ureter allowed to drop in the wound.

If the ureter is infected and its cavity dilated and full of pus, it must be thoroughly cleansed, both by washing and by scraping with a sharp spoon. After being cleansed the ureter may be ligated and allowed to retract into the wound, or it may be left open and fixed to the lumbar wound by a few stitches.

If the disease be tubercular and the ureter involved, it may be followed through the lumbar wound down to the brim of the pelvis and excised to that extent. In any event, an effort should be made to deprive the distal end of the ureter of its mucous lining and to close the upper opening of the distal

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segment by inverting it. (If the kidney is so firmly adherent to its surroundings as to make removal by the usual method very difficult, then its fibrous capsule may be opened and the kidney proper separated from its capsule and removed, leaving the fibrous capsule *in situ*. Any diseased material adhering to the capsule is to be scraped away.)

When it has been necessary to clamp a large mass together with the pedicle, it is best to leave the clamps in the wound for three or four days, rather than to attempt separate ligation.

Describe abdominal nephrectomy.

This operation is suitable for the removal of very large growths. The incision may be made through the linea semilunaris or in the linea alba, or by a transverse incision. After the abdominal cavity has been opened the hand is introduced and the opposite kidney felt; if it be present and not diseased the operation is continued.

The intestines are pushed toward the median line and the field of operation surrounded with gauze. The peritoneum covering the kidney is then incised, dissected up, and drawn away from the kidney on either side by means of forceps applied to either edge. It is important that the peritoneum be incised external to the colon, so that the blood supply of the latter may not be interfered with. After the kidney is exposed it is freed by blunt dissection; the structures forming the pedicle are then isolated and tied separately, the pedicle divided, and the kidney removed. All bleeding is arrested, the wound in the peritoneum closed with catgut, all gauze removed, and the opening in the parietes closed in the usual manner.

What is nephro-ureterectomy?

The removal of both kidney and ureter.

In many cases of tubercular or suppurative kidney it may be necessary to tie off the ureter at the brim of the pelvis or at as low a point as possible, even to the bladder insertion.

When the ureter is to be tied off low down, it is necessary to prolong the parallel incision into the loin (parallel to and

two finger-breadths above Poupart's ligament) and to follow the ureter down into the pelvis, where it can be reached and tied off near the bladder.

Describe tubercular nephritis.

The kidney may suffer from miliary tuberculosis or the chronic form.

Miliary tuberculosis is common in the young and is likely to involve other parts of the urinary tract. Chronic renal tuberculosis is usually secondary, the primary focus being in any part of the system. One kidney being affected, the other is likely to become so from infection, reaching it by way of the bladder. Breaking down, the tubercles form cavities. Mixed infection is the rule. The ureter is likely to become involved, causing hydronephrosis or pyonephrosis.

What are the symptoms of tubercular kidney ?

Miliary tuberculosis of the kidney is not likely to attract attention. The bacillus may be found in the urine.

In chronic tuberculosis there may be no symptoms until an abscess opens into the pelvis of the kidney. This usually causes lumbar aching and possibly symptoms resembling those of renal colic.

Following pyuria from this source there are symptoms of cystitis.

Blood-cells and tubercle bacilli present intermittently. The symptoms are now those of cystitis, pus, mixed infection, and the kidney is probably enlarged. The purulent urine of the latter stage of renal tuberculosis is always acid; it is albuminous, perhaps tinged with blood, and contains casts of various qualities. In both forms the prognosis is bad.

What is the treatment for tubercular kidney ?

In miliary tuberculosis there is none, except that for the general health.

If the tuberculosis occurs in an otherwise healthy person and but one kidney is affected, nephrectomy is proper.

What is neuralgia of the kidney ?

The kidney, like other organs, may be painful from reflex

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disturbances. This oftenest depends upon a lesion elsewhere in the genito-urinary tract. The kidney may be tender and the pain terribly acute, with a distribution similar to that of renal colic. The quantity of urine is increased, but it has no abnormal ingredients.

Splitting the capsule has been successful in relieving the condition in a limited number of cases.

GONORRHEA.

What is gonorrhea ?

Gonorrhea, also called clap, blennorrhea, and blennorrhagia, is an acute infectious and virulent process characterized by a purulent discharge containing gonococci.

The disease attacks most frequently the mucous membrane of the genital tract, but the mucous membrane of the eye, the anus, and the rectum may be the seat of the trouble.

What is urethritis ?

A general term used to designate inflammation of the urethra.

How may urethritis be divided ?

Acute, chronic, and abortive. Acute and chronic urethritis may be specific or simple ; abortive urethritis is always non-specific.

Specific urethritis is caused by the gonococcus. (The word "specific" is often used synonymously with gonorrhea.) Simple urethritis may be bacterial (non-gonococcic), chemic, or traumatic.

Describe the gonococcus.

The gonococcus was discovered by Neisser in 1879. It is a relatively large micrococcus and appears as a diplococcus. Each half of the diplococcus is kidney-shaped, and the two resemble a coffee bean. They lie close in pairs, their flat sides together, their outer margins convex. Under the microscope they appear in pairs, in fours, in eights, etc., but never in chains. They are found in heaps within the protoplasm, and also scattered between the cells.

What is the pathology of acute gonorrhea ?

When introduced into the urethra the gonococci penetrate between the epithelial cells and are found in the submucous connective tissue. Colonies develop in the interepithelial spaces and upper layers of the submucous connective tissue. Their toxins dilate the blood-vessels and a discharge of serum

and leukocytes follows. The cylindric epithelial cells lining the urethra are loosened by the flow, and erosions are formed. The gonococci are carried away by phagocytosis and thus removed from the tissues. When the stage of decline commences the epithelial erosions begin to undergo repair by being covered with squamous epithelium. The gonococci which have been removed from the deeper layers now begin to grow luxuriantly on the free surfaces of the mucous membrane, and a desquamation of the upper layers of the newly formed epithelial cells takes place, carrying with it the

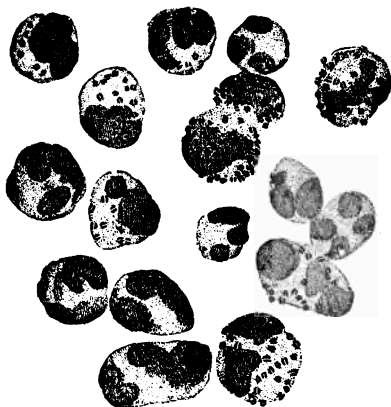


FIG. 41.—Gonococci in leukocytes; cover-glass preparation of gonorrheal pus.

attached colonies of gonococci. In ordinary cases the process of getting rid of the gonococci is accomplished in the ascending stage by phagocytosis, and in the stage of decline through desquamation of the epithelial cells. (Morton.)

Why does gonorrhea relapse?

Because the gonococci may lie dormant within the crypts of Morgagni, the glands of Littre, Cowper's gland, the prostatic crypts, or in the seminal vesicles, until venereal excitement, irritating urine, or alcoholic excess sets up an inflammation in these locations, rendering the germs active.

How can gonorrhea be diagnosticated ?

From a history of coitus within three weeks, redness and puffing of the meatus, a purulent discharge containing gonococci, and burning during and after urination.

How is the presence of the gonococcus determined ?

A small portion of the discharge is smeared upon a clean slide or cover-glass, allowed to dry, then fixed by passing the slide or cover-glass, specimen side up, three times over the flame of an alcohol lamp. A solution of gentian violet (saturated solution gentian violet 10 parts, 2 per cent. carbolated water 90 parts) should be dropped from a clean rod until the specimen is covered. This is allowed to remain about two minutes and then removed with cigarette paper. Then there is dropped from a clean glass rod sufficient of the following solution to again cover the slide: Gram's solution (iodin 1 part, iodid of potash 2 parts, water 300 parts). This second stain should cover the specimen for three minutes. Remove the excess of fluid with cigarette papers without using water. Then absolute alcohol is dropped on the specimen until the slide looks clear to the eye. (Perhaps three minutes may be allowed for this application.) After the use of the alcohol the excess can be removed with water and the specimen dried with cigarette paper. It is then counterstained by covering the specimen with the following solution, called Bismarck brown (Bismarck brown, 3 parts; distilled water, 70 parts; alcohol, 30 parts). This stain should remain for about two and a half minutes. The excess should then be removed with water and the specimen dried with cigarette paper or in the air. It is then ready to mount for examination.

What is the effect of this stain ?

The gentian violet stains all bacteria present in the specimen. When Gram's solution is applied in the presence of the anilin dye, it forms an insoluble deposit in all the bacteria except the gonococci. This insoluble deposit is not dissolved when treated with the alcohol, and all bacteria except the gonococci retain the stain. The Bismarck brown stains the gonococci brown, but does not influence the violet color

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of the other bacteria. The microscope may show numbers of bacteria resembling the gonococci, but they will be stained violet, while the gonococci in contrast are stained brown.

What is the prognosis of gonorrhea ?

Favorable, so far as immediate danger to life is concerned, but its remote sequelæ cost many lives.

The duration of a first case of gonorrhea is from five to eight weeks. Subsequent ones are shorter in their acute stage, but more likely to be followed indefinitely by a slight discharge.

What is the relative frequency of gonorrhea ?

It is the most prevalent disease of sexual intercourse, and occurs oftener in the male than in the female. The mucous membrane of the female genital tract is less susceptible to infection, being more or less protected by its own secretions.

How may infection take place ?

By direct infection—a transference of the gonococcus-bearing discharge from the genitals of one person to those of another during coition or through some unnatural practice.

By mediate infection—the gonococcus-bearing discharge being conveyed by some inanimate object, as a towel or nozzle of a syringe.

How is gonorrhea divided for descriptive purposes ?

Acute and chronic, anterior and posterior gonorrhea ; three stages : increasing, stationary, declining.

What is acute anterior gonorrhea ?

Gonorrheal inflammation of the urethra in front of the cut-off muscle.

Describe the first stage of acute gonorrhea.

The period of incubation may last from forty-eight hours to three weeks, the average time being five days. The first symptom is a feeling of uneasiness at the meatus, then a tickling, then a sense of burning, and the exudation of a

pearly drop from the now slightly pouting, red meatus. Increased swelling, heat, redness, and pain soon follow. The discharge, which at first was scanty, becomes abundant, and there is a burning sensation during urination called *ardor urinæ*. This symptom is caused by the distention of the inflamed and thickened urethral walls and by contact of the salts of the urine with their sensitive surfaces.

What is the duration of the first stage?

About eight days.

What is the second or stationary stage of acute gonorrhea?

This stage begins when the entire anterior urethra is involved by the inflammatory process and is the interval during which the symptoms maintain their height. It lasts from four to ten days in first attacks. Its prominent symptoms are profuse discharge and *chordee*.

Chordee, the most painful symptom of this stage, depends upon inflammatory thickening of the corpus spongiosum preventing its normal elongation during erection. The distending corpora cavernosa draw upon it as a bow draws upon a string. *Chordee* is most likely to occur during the after-part of the night, when reflex irritation from a distended bladder may cause erection. It occurs also in response to lascivious thoughts or sights or to friction of the genitals.

Describe the third or declining stage of acute gonorrhea.

The discharge becomes less creamy, owing to its being more largely mucus; the meatus pouts less, urination is not so painful, and inflammation is less. Microscopic examination of the discharge shows the pus cells in groups rather than scattered.

What is the treatment of acute gonorrhea?

The bowels should be freely moved at regular intervals, preferably by U. S. P. improved compound cathartic pills. Diet should be restricted to skimmed milk and cereals. No alcoholic or malt beverages in any form should be allowed, and sexual excitement should be avoided. Rich dishes, asparagus, rhubarb, acid fruits, and concentrated foods, espe-

cially at night, are harmful. Animal food should be taken sparingly.

Pain during urination may be lessened by placing the penis in a cup of hot water during the act; inflammation combated by hot and cold applications and hot hip-baths.

How may drugs used to combat urethral inflammation be classified?

Into urinary antiseptics, alkalies, demulcents, anodynes, balsams, and astringents.

What drugs are commonly used as urinary antiseptics?

Urotropin, methylene-blue, salol, benzoic acid, and boracic acid are excellent antiseptics, but they have little value in inflammations of the urethra below the cut-off muscle.

When are the alkalies useful?

When the urine is acid an alkali is needed. When the urine is acid and dense (above 1015) a diuretic alkali is indicated. When the urine is alkaline a diluent not an alkali should be employed, as the ingestion of quantities of any pure water. Liq. potassii is the most anodyne of the alkalies and should therefore be used in acute cases. The citrate in large doses causes gastric catarrh; in small doses it is useful in chronic cases. The acetate is the most diuretic.

The bromid acts as an alkali, and is indicated for nervousness.

Bicarbonate of soda promotes alkalinity and aids digestion.

Sweet spirits of niter, while possessing slight alkaline properties, is used as an anodyne when there is irritation of the bladder neck, especially in women.

What anodynes are useful in acute gonorrhea?

Hyoscyamus potash salts, heat and cold.

The alkalies and anodynes may be combined as follows:

R	Liq. potassii,	ʒij-vj;
	Tr. hyoscyami,	ʒss-j;
	Syr. cinnamomum,	q. s. ad ʒiij.—M.

Sig.—A teaspoonful in water two hours after each meal.

R Potassii citratis,	℥ss-j;
Spr. limonis,	℥ss;
Syr. simplicis,	℥ij;
Aquæ,	℥j.—M.

Sig.—Dessertspoonful, well diluted, every four hours.

R Potassii acetat.,	℥j;
Syr. aurantii corticis,	℥iss;
Aquæ,	q. s. ad ℥viii.—M.

Sig.—One tablespoonful every three hours.

What demulcents may be used in acute gonorrhœa ?

Flaxseed tea, gum-water, elm-bark water, teas made from buchu, pareira brava, uva ursi, triticum repens, and corn-silk. They have fallen somewhat into disuse, although those which are diuretic are of real value.

What balsams and astringents are used in acute gonorrhœa ?

In the order of their usefulness they are oil of yellow sandalwood, balsam of copaiba, cubebs, oil of wintergreen, eucalyptus, pichi, spirits of turpentine, tincture of cantharides, and tincture of the chlorid of iron. Oil of yellow sandalwood should be given in at least 10-drop doses after meals. It may be administered in capsule form. If this amount congests the kidneys, substitute copaiba or cubebs, or both.

The following combinations are efficient :

R Potassii citrat.,	℥ij-vj;
Ol. santal.,	℥iv-vj;
Syr. acaciæ,	℥j;
Aquæ menth. pip.,	q. s. ad ℥ij.—M.

Sig.—A teaspoonful in water two hours after eating.

R Liq. potassæ,	℥j;
Bals. copaibæ,	℥j;
Ol. gaultheriæ,	℥x;
Ext. glycyrrhizæ,	f℥ss;
Saccharini,	q. s.;
Muc. acaciæ,	q. s. ad ℥iv.—M.

Sig.—Teaspoonful every three hours.

R Ol. cinnamomi,	℥x;
Ol. cubebæ,	
Sp. æther. nit.,	ââ ℥ss;
Muc. acaciæ,	q. s. ad ℥vii.—M.

Sig.—Tablespoonful three times a day.

Cubebs, wintergreen, and turpentine are indicated in the declining stage. The dose of cubebs is a teaspoonful of the fluid extract or 10 to 20 drops of the oleoresin in capsule form. Wintergreen is valuable when inflammation lingers in the posterior urethra, 10 drops of the oil being given after each meal. The oil of turpentine is used to clear up the terminal stage, being too stimulating in acute congestions. The dose should be 1 drop after meals, which dose may be gradually increased to 5 drops.

Many gonorrheal patients need tonics, including iron, and regimen in the interest of their general health during the stage of decline.

Describe the local treatment for acute anterior gonorrhea.

If the patient is in bed the genitals should be slung upon the pubes as directed for swelled testicle. If he declines to go to bed he should wear a suspensory bandage and dress the penis in a fold of gauze. The collar dressing of Taylor is made 4 inches square, with a slit in the center through which the glans is passed. The slit fits around the sulcus, while the gauze falls forward over the head like a skirt, the foreskin being brought forward like an overskirt. This dressing allows free drainage, protects the glans from friction with the prepuce, and prevents the accumulation of discharge under the foreskin, and resulting balanitis. Pocketing the discharge with a wad of cotton held over the meatus by the foreskin is to be avoided. Inflammation should be combated with hot applications.

How may dry heat be applied ?

Fill a fountain syringe with hot water, coil its rubber tube around the penis from head to root, and place a vessel to catch the water at the distal end of the tube.

How may wet heat be applied ?

By flannels wrung from hot water, or a cup bath, hotter water being poured in until the limit of endurance is reached.

How may cold be applied ?

Use the fountain syringe, filling it with cold water instead of hot; or cloths containing crushed ice may be applied.

What is the prophylactic treatment of chordee ?

Empty the rectum by hot injections. Before retiring the penis should be held against a cloth wrung out of very hot water. The patient should go to bed with bladder empty. Bed-covering should be light, the bedroom cool, a hard mattress is preferable, and the patient should lie on his side rather than on his back.

What drugs may prevent chordee ?

Locally :

R Liq. morph. Magendie,	ʒij;
Cocainæ muriat.,	gr. xx;
Aquæ,	ʒij.—M.

Sig.—Inject about a dram into the urethra and hold there for a few minutes.

Internally :

R Fl. ext. ergotæ,	℥xv;
Tr. gelsemii,	℥v;
Potassii bromidi,	gr. xx;
Tr. hyoscyami,	℥xxx;
Syr. aurantii.	q. s. ad ʒss.—M.

Sig.—To be taken at bedtime.

When is opium indicated ?

In cases of prolonged suffering sufficient to exhaust the patient. Opium concentrates the urine and hardens the stools, and should be used only when absolutely necessary.

The following is an excellent combination :

R Morph. sulph.,	gr. $\frac{1}{2}$;
Ext. hyoscyami,	gr. $\frac{1}{2}$;
Camph. monobromatæ,	gr. v.
M. ft. suppos. No. 1.	

Sig.—Take at bedtime.

What is the active treatment of chordee ?

A solution of cocain thrown into the urethra by a P. P. syringe affords temporary relief. Stepping on the cold floor with bare feet quickly gives relief. Placing the penis against a cold object, as a frosty window-sill, is also productive of

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relief. The ethyl chlorid spray along the course of the urethra subjects the most unruly penis.

Breaking the chordee by forcibly straightening the penis is likely to rupture blood-vessels and should not be practiced.

What is the treatment of the third stage of acute gonorrhea?

Tonics and injections.

Tonics during the third stage are important. The general system is run down from restricted diet, loss of sleep, and nervous strain incident to a severe clap. Basham's mixture of iron (given in tablespoonful doses after meals), the elixir of quinin, strychnin, and iron (teaspoonful after meals), wine of cod-liver oil (like dose), Blaud's pills (two after meals), and allied preparations, are useful.

Injections for the first and second stages of acute gonorrhea, unless the irrigation method has been employed from the beginning, should be restricted to soothing preparations. Astringent injections should be reserved for the third or stage of decline, the treatment being finished with the use of mild antiseptic solutions.

Soothing injections:

R Morphine acetat., gr. iij;
Liq. plumbi. subacetat. dil., ʒiij.—M.
Sig.—Inject after each urination.

R Hydrastinæ, ʒij;
Mucilaginis acaciæ, ʒviij.—M.
Sig.—Inject three times a day.

Astringent injections:

R Zinci sulphatis, gr. vj;
Liq. Magendie, ʒij;
Aquæ, q. s. ad. ʒiv.—M.
Sig.—Inject three or four times a day. (Increase the zinc until it produces a feeling of warmth—not pain—in the canal.)

R Plumbi acetatis, gr. vj;
Aquæ, ʒiv.—M.
Sig.—Inject after each urination, as described in the prescription for the zinc preparation.

Zinc and lead may be given in combination, as shown by the following time-honored prescription:

℞ Zinci sulphatis,
 Plumbi acetatis, āā gr. viij;
 Ext. opii aq., ʒij;
 Aquæ, ʒvj.—M.
 Sig.—Inject after each urination.

The use of the sulphocarbolate of zinc has proved of value in some cases that have seemed rebellious under other preparations of zinc. It may be given in the following combination :

℞ Zinci sulphocarbolutis, gr. xx;
 Aquæ dest., ʒviij.—M.
 Sig.—Inject after each act of urination.

Alum is frequently used when other drugs fail :

℞ Alum, crud., gr. xx;
 Aquæ, ʒviij.—M.
 Sig.—Inject after each act of urination.

Bismuth subnitrate, either following the astringent injections, or the irrigation method, frequently dries the lingering moisture of a protracted clap. It may be given as follows :

℞ Bismuth subnitrate, ʒiij;
 Aquæ dest., ʒviij.—M.
 Sig.—Inject night and morning. Shake before using.

Antiseptic injections :

This class is very effective as an adjuvant to the astringent medication or the irrigation method. They may be employed to advantage during the declining stage and frequently act promptly during the chronic stage. The following may be used :

℞ Sol. protargol,	0.25 per cent. to 1 per cent.
℞ Sol. mercuriol,	0.25 per cent. to 1 per cent.
℞ Sol. nargol,	1–5 per cent.
℞ Sol. argyrol,	2–10 per cent.

Describe a good syringe.

The glass syringe having a blunt tip and a rubber plunger

with a capacity of half an ounce is an excellent one. A syringe with a long nozzle is to be avoided.

Describe the method of using the hand syringe for urethral injections.

The patient after having urinated should stand over a vessel, and, having washed the foreskin and glans and filled the syringe and tested it to see that the piston works smoothly, should hold it between the thumb and finger of the right hand with the index finger upon the outdrawn plunger. He should then insert the tip of the syringe into the meatus and grasp the glans laterally by the thumb and finger of the left hand, pinching the meatus above so as to lessen the lumen of the outlet without bruising it by pressing directly against the nozzle. The contents of the syringe should be discharged slowly. The injection should remain in the urethra about half a minute. Any injection which causes severe burning for five minutes after its discharge is too strong and should be diluted.

Describe the irrigation treatment of inflammation of the anterior urethra.

The armamentarium for the irrigation treatment consists of a glass percolator, capable of holding about a quart, armed with a rubber tube ending in a glass nozzle, surrounding which is a cup-shaped shield to protect the surgeon from the splattering of the solution. There is an excellent hard-rubber nozzle and shield on the market, which can be easily cleansed.

The surgeon should protect his eyes with glasses to avoid acquiring gonorrheal ophthalmia from contact with the fluid, should any be spattered in his face.

The percolator is hung on a bracket which can be elevated or lowered as needed. An elevation of 5 to 7 feet is sufficient, unless the cut-off muscle is to be overcome and the bladder irrigated.

The patient exposes the penis and scrotum, a towel is folded in the crotch of the trousers, the long end hanging down to protect the clothing. He stands beside a chair on which is placed a jar to catch the fluid after it escapes from the urethra. The penis is held gently but firmly by the left hand of the operator. After directing the stream against the glans

penis and the sulcus to cleanse these parts the nozzle of the syringe is inserted into the meatus. The stream is gradually allowed to enter with full force. The urethra should be ballooned with the solution so as to insure contact with its entire mucous membrane. The injection usually used is a solution of permanganate of potassium, ranging from 1 : 4000 to 1 : 1000, and as warm as can be comfortably borne by the patient. If this treatment is begun within a few hours of the first appearance of the discharge, and continued morning and evening for five days, the acute stage is usually by that time practically over and the discharge becomes watery and slight. An irrigation should be given once a day for five days longer. When the acute symptoms have subsided and the discharge has been controlled for, say, ten days, irrigation should be stopped and hand injections should be administered by the patient himself, as described for the third stage of acute gonorrhea. The irrigation method brings about the stage of decline sooner than any other method. The first irrigation during the early stage of the inflammation is often painful, but by the third day the treatment gives comfort. Santal oil in 10-drop doses or more three times a day should be given from the beginning in this treatment, as well as when hand injections are employed from the first.

What is acute posterior gonorrhea ?

Gonorrheal inflammation of the urethra behind the cut-off muscle.

It extends by continuity of structure through the cut-off muscle and may attack every part of the genito-urinary tract.

The probability of extension is increased by severe exercise, venery, too strong injections, inebriety, and neglect. The posterior urethra is involved to some extent in about 80 per cent. of cases not treated by the irrigation method.

What are the symptoms of acute posterior gonorrhea ?

About the second week of the anterior inflammation there is noticed a slight burning sensation deep in the perineal region, with a sense of weight and transmitted pain to the end of the penis, especially noticed after the act of urination, and there is an increase in the number of urinations. The

flow from the anterior urethra frequently ceases abruptly even during the presence of an abundant secretion. The pus from the posterior urethra flows back into the bladder and is found in the urine. As the disease increases the acts of urination are so frequent and painful that there is a condition of tenesmus present, due to the congestion of the prostatic urethra which causes reflex spasm of the cut-off muscle. When tenesmus is severe there is usually some hematuria. At the end of urination the sphincters contract upon the inflamed and eroded prostatic urethra and squeeze blood from it. The blood usually follows the urine, but may appear before all the urine has been voided. Occasionally a little mass of clotted blood, formed during the intervals of urination, will be extruded with the first few drops of urine voided. The hemorrhage is usually slight, but may be severe. In severe cases of posterior urethritis either retention or incontinence of urine is not uncommon. The former is caused by contraction of the sphincters or from tumefaction of the lining mucous membrane of the prostatic urethra: the latter, a condition of relaxation of the compressor urethræ muscle—seen when the posterior inflammation is not so great—results in loss of control of the sphincters. The urine may be expelled by a sudden impulse or may dribble away. Erections are rather frequent if the posterior inflammation is severe, and are caused by hypersensitiveness of the posterior urethra.

What is the treatment for acute posterior gonorrhea?

The patient should be put to bed at the first indication of posterior involvement. The diet should be restricted to milk, the ingestion of great quantities of any pure water, and a genito-urinary sedative as the following should be given:

R Potass. bicarb.,	3j;
Tinct. hyoscyam.,	
Fld. ext. kava-kava,	āā ʒss;
Aquæ,	q. s. ad ʒviij. —M.

Sig.—A tablespoonful in water every three hours.

In many cases, both severe and mild, the following combination has produced much comfort:

R Fl. ext. tritici repent.,	
Fl. ext. uvæ ursi,	aa $\frac{3}{4}$ ss;
Liq. potassæ,	$\frac{3}{4}$ ss;
Tr. opii,	gtt. v;
Aquæ,	q. s. ad $\frac{3}{4}$ iv.—M.

Sig.—Teaspoonful every three hours in a wineglassful of water.

The bowels should be kept open and hot sitz baths given several times a day if the inflammation is severe. Hot applications to the perineum and over the pubic bone give great comfort. Alternating hot and cold rectal injections followed by opium and belladonna suppositories may be needed. Injections of the anterior urethra should be stopped. Santal oil in 10-drop doses every four hours frequently eases the pain of tenesmus, and when the latter is very severe and accompanied by hemorrhage a few drops of a solution of nitrate of silver—10 gr. to 1 oz. deposited in the posterior urethra by instillation (see Instillations, p. 172)—give great comfort. It is frequently advisable in severe cases to give small doses of laudanum to calm and soothe the patient, thus improving his *morale*.

Hematuria, unless very violent, needs no special treatment. If the bleeding is alarming it may be controlled by a perineal compress.

Erections and incontinence need no special treatment, as both subside with the decline of the posterior inflammation.

Retention if persistent needs attention. The patient should be given a hypodermic injection of $\frac{1}{4}$ gr. of morphin and surrounded with hot-water bottles to produce relaxation. This failing, make an aseptic catheterization.

As soon as the posterior urethra can be medicated locally, without great discomfort to the patient or liability to increase the inflammation by mechanical interference, irrigations should be given (see Irrigation Treatment for Chronic Posterior Urethritis, p. 171). If the inflammation is fairly severe, irrigations with a silver nitrate solution, strength 1:20,000 and gradually increased to 1:8000 to 1:4000, or a 2 to 5 per cent. argyrol solution may be used, and later boracic acid solutions, or alum solutions, or sulphate of zinc solutions, or of permanganate of potassium—all given hot—may be used, finally ending the cure with a bismuth

solution. Sounds and bougies must not be introduced into the bladder at this stage of the disease.

What are the complications of acute gonorrhea ?

Balanitis, balanoposthitis, phimosis, paraphimosis, herpes progenitales, papillomata, folliculitis, juxto-urethral sinuses, inflammation of the lacuna magna, periurethral abscess or phlegmon, lymphangitis, adenitis, and Cowperitis.

What is balanitis ?

An inflammation of the mucous membrane of the glans penis from retained secretion. Mild attacks are characterized by a feeling of heat and itching about the head of the penis, redness and swelling near the preputial orifice, an offensive discharge, and, later, infiltration into and erosion of the mucous membrane covering of the glans. In the severe forms the glans becomes swollen and tumid; its epithelium and that of the sulcus sloughs in spots and the discharge is free and purulent.

What is the treatment of balanitis ?

Expose the glans by retracting the foreskin. If necessary incise the preputial band. Cleanse the surface of the glans with warm water, or peroxid of hydrogen (1 : 3), and wipe dry.

If there are no excoriations a gauze dressing impregnated with calomel or pulverized acetanilid placed between the glans and foreskin prevents heat, friction, and moisture, and a cure quickly follows.

If there are excoriations clean their surfaces and touch with the silver stick, or with carbolic acid by means of a pledget of cotton on the end of an applicator, and dress dry as described above.

Relapsing balanitis is best cured by circumcision. In many cases solutions of sulphate or acetate of zinc (1 : 100) are very curative. Strong tincture of iodine has been used with benefit in cases of diphtheritic balanitis. Balanitis resulting from early syphilitic lesions is much benefited by the use of black or yellow washes.

What is balanoposthitis ?

An inflammation of the mucous membrane covering the glans penis and prepuce. The end of the penis is frequently swollen and edematous, taking the appearance of a pig-tail twist or of an Indian club. The discharge is greenish in color and pours from the preputial orifice. Excoriations, erosions, and even sloughing of considerable mucous membrane surface may follow. There may be distressing erections. In neglected cases the inflammatory deposit becomes so organized that the usefulness of the penis as a sexual organ may be destroyed. This condition requires circumcision.

What is the treatment of balanoposthitis ?

When the prepuce can be retracted it is practically the same as for balanitis. When there is phimosis the glans and mucous membrane of the foreskin must be cleansed by subpreputial injections of antiseptic washes. If this fails, expose the glans by circumcision and treat as for severe balanitis.

What is phimosis ?

An abnormal narrowing of the opening of the preputial orifice preventing the retraction of the foreskin. Phimosis may be congenital or acquired.

Describe congenital phimosis.

The prepuce cannot be retracted. Traction produces a white ring about the tip of the penis, which is the constricting band ; or a puckering of the end of the redundant foreskin. A probe should be used to break up the adhesions before they become too firmly organized.

Describe acquired phimosis.

This results from inflammatory contraction of the preputial opening. Temporary phimosis frequently occurs from swelling occasioned by urethritis or chancroids. Subpreputial warts, concretions, confined smegma, or irritation from contact of the urine may cause phimosis.

What is the treatment of phimosis ?

Swelling and edema of the foreskin should be reduced by

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hot cloths. Antiseptic injections should be thrown between the prepuce and glans with a flat-beaked syringe, and the



FIG. 42.—Phimosis from gonorrhea (Cullerier).

entire organ supported against the abdomen. Lead water and opium may be used, as in the following combination :

R	Liq. plumbi subacetatis dil.,	$\frac{3j}{\text{}};$
	Tr. opii,	$\frac{3ij}{\text{}};$
	Aquæ,	$\frac{3v}{\text{}};$
	Sig.—Apply locally.	—M.

If reduction is impossible, resort to circumcision.

Describe circumcision.

The prepuce is composed of two layers, separated by lax cellular tissue. The internal or mucous layer is reflected upon the body of the penis just behind the sulcus, and cannot

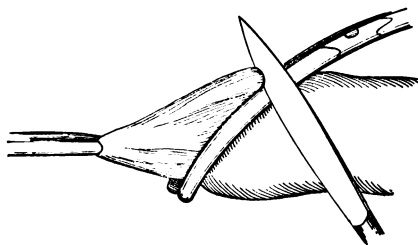


FIG. 43.—Method of performing circumcision with clamp (Curtis).

be drawn over the glans any great distance. The external, or integumentary, layer, on the contrary, is continuous with

the skin of the penis, and may be greatly elongated. It follows that a section of the prepuce in front of the glans will include the integumental layer with but a small portion of the mucous membrane layer. Wash the penis thoroughly. Anesthetize the integument in a circle around the penis in the line of proposed incision by hypodermic injections of a 4 per cent. solution of cocain. Fill the preputial cavity with 6 per cent. solution of cocain and hold it within the cavity by compressing the end of the foreskin for at least five minutes.

Catch the prepuce at its mucocutaneous junction above and below with artery forceps. Put the preputial orifice on the stretch by separating the forceps, and then draw the foreskin well for-

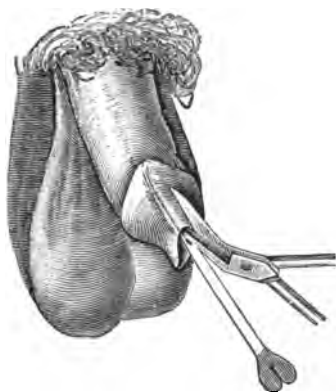


FIG. 44.—Dorsal incision for phimosis.

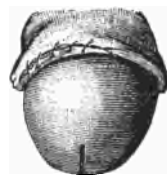


FIG. 45.—Result after lateral incisions for phimosis with subsequent trimming and suture.

ward. When in this position clamp the foreskin with phimosis forceps placed at an angle of sixty degrees with the long axis of the penis and touching the bottom artery forceps. The foreskin, being on the stretch beyond the phimosis forceps, should then be incised with scissors close to the edge of the forceps and then liberated. The integumental layer will recede above the glans, but the mucous membrane layer will usually be found lying upon it. Insert the dull blade of a pair of scissors between the mucous layer and the glans and cut along the dorsum to within about one-fourth of an inch of its insertion; then trim around the glans, keeping parallel to the corona glandis and about one-fourth of an inch from it. When the frenum is reached, cut outside of it. After

trimming, the integumental flap must be united to the mucous membrane flap by sutures. Eight are usually introduced. Do not use catgut except in children. The first stitch should be placed on the dorsum, the second at the frenum. Three stitches follow on each side between the first and second stitches. Dress the wound dry. Give large doses of bromid of sodium to prevent erection, and put the patient to bed for twenty-four hours. Edema, slight hemorrhage, and dark infiltration occasionally follow, which may be combated by rest. If moderate bleeding takes place after the operation, apply a tight bandage over the original one. If this does not check bleeding and the organ swells, take off the dressing, cut the stitches, turn out the clots, find the point of bleeding and ligate, restitch the flaps, and dress as before.

What is paraphimosis?

A tight prepuce, contracted behind the glans, resulting in strangulation of the penis. The glans swells and there follows



FIG. 46.—Paraphimosis (Cullerier).

edema of the prepuce and skin of the body of the organ. The constricting band lies in the first furrow back of the sulcus.

What is the treatment of paraphimosis?

Thoroughly anoint the organ with sweet oil; grasp the penis with the left hand and squeeze the swollen folds, so as to reduce the edema as much as possible. Squeeze the blood

from the turgid glans, circle the organ with the thumb and finger of the left hand behind the preputial constriction, and



FIG. 47.—Reduction of paraphimosis.



FIG. 48.—Reduction of paraphimosis.

press the glans through it with the fingers and thumb of the right hand.

If reduction is impossible, owing to a great amount of lymph having been thrown out, insert a small knife flatwise

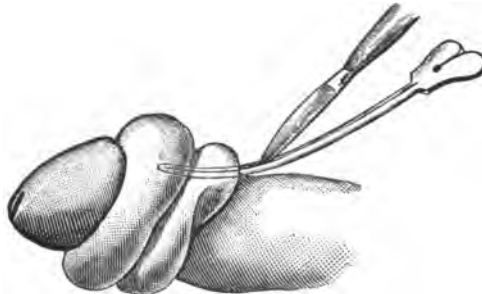


FIG. 49.—Division of paraphimosis (Curtis).

between the body of the penis and the constricting ring, turn the cutting edge upward and withdraw, dividing the constricting band; or having inserted a small grooved director

under the band, cut along the guide. The ring may be so deeply imbedded in inflammatory deposit that it can be reached only by dissecting down upon it without a guide. The band being cut, reduction is easy. Rest and hot applications are sufficient to bring about a complete recovery.

What is herpes progenitales ?

A sudden appearance of vesicles, single or in clusters, upon the mucous membrane or skin of the penis. They are most frequently seen behind and upon the glans, especially if the prepuce is redundant. They depend upon either direct or reflex irritation from some point in the genito-urinary tract. Persons suffering from dyscrasia are most liable to have them. There is first a sensation of heat, and there appears a minute vesicle with a red infiltrated base. The warmth and moisture under the foreskin macerate the vesicles, forming erosions. When upon the skin the vesicles break and form crusts.

What is the treatment of herpes progenitales ?

First, surgical cleanliness. The foreskin should be retracted, the parts thoroughly washed and dried, and the vesicles touched with the silver stick if they are deep. When inflammation is severe immerse the penis in a cup of hot water. A lead-and-opium lotion can also be used. Black and yellow washes are useful, and frequently the red wash will produce prompt healing.

After applying any lotion, or if the parts are dressed with a drying powder, such as pulverized acetanilid, oxid of zinc, or bismuth, a gauze dressing should be applied to separate the glans from the prepuce.

In relapsing herpes the following is of considerable use :

R	Ext. hydrastis,	℥ij;
	Aquæ,	℥j.—M.
Sig.—Apply locally.		

Where ulceration plays an important part in the disease it most usually occurs in run-down or debilitated patients. Treatment appropriate to the general condition present should supplement the local treatment.

Indolent ulcers require curettement, silver stick, or carbolic acid to stimulate them, followed by a dry dressing.

To suppress inflammatory reaction after active interference the penis should be for a time kept swathed in cloths wrung out of hot water. Where great pain is experienced a solution of cocain may be applied.

What are papillomata ?

Warts formed upon the integument or mucous membrane by hypertrophy of the papillæ, attended by thickening of the



FIG. 50.—Papillomatous hypertrophy of the penis (case of Dr. R. Abbe).

tissues immediately surrounding them, and by enlargement of the capillaries. These growths are known as vegetations, verrucæ, moist, dry, or fig warts, and are not necessarily venereal in origin.

They may be of any size, discrete or confluent, hard or soft, depending upon situation and the degree of moisture. Papillomata result from uncleanness, irritating secretions, such as gonorrheal pus, especially if the prepuce is redundant. They may appear in the coronary sulcus, the posterior border of the glans, the under surface and margins of the prepuce, the region of the frenum, or the orifice of the meatus.

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What is the treatment of papillomata ?

Complete removal. If small and soft with narrow bases and situated on the mucous membrane or at the mucocutaneous junction, they should be lifted up and snipped off, their bases touched with fuming nitric acid before the forceps are released. They should be dressed dry.

The following combination may be applied :

R Calomel,	3ss;
Tannin	3j;
Oxide of zinc,	3ss.—M.

Sig.—Apply locally.

If surgical interference is not expedient the following application is excellent for the removal of small vegetations :

R Acid acetic,	3j.—M.
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Sig.—Apply to wart by means of cotton pledget. Repeat if necessary.

Large warts may be shaved off and their base touched with nitric acid. They may also be curetted smooth with the surrounding surface and touched with carbolic acid.

Where these growths are matted together in a great mass, their tops completely hiding the pedicles, a bichlorid of mercury solution, 3 gr. to 1 dr. of flexible collodion, may be painted on and repeated the next day. This is so painful that morphin must be given to induce sleep. The mass may be readily removed by the curet under general anesthesia. Where the growths are not large, some such combination as given in the following prescription succeeds very well :

R Acid salicylic,	
Chrysarobin,	āā 3ss;
Collodion flex,	3j.—M.

Sig.—Apply to growth daily until removal is possible.

What is folliculitis ?

Inflammation of the mucous follicles. During a urethritis, especially in the acute stage, the inflammatory process may involve any number of the urethral follicles by traveling down their ducts. Palpation shows them as indurated spots

from the size of a shot to that of a pea. They are most frequently found along the floor of the urethra. They usually break down and discharge into the urethra, and then heal from the bottom; but any one of them may become a nidus for gonococci, which will subsequently reinfect the canal. Fistulous openings are sometimes formed in the first inch of the urethra by the rupture of a follicular abscess in the floor of the canal.

If the urethra is first cleansed, the surgeon can see the discharge coming from the duct of one of these glands while he makes pressure. In many cases of urethritis red lines may be seen following the long axis of the penis between the layers of the prepuce and extending from its free margin. They are minute abscess tubes, often 1 inch in length, containing greenish pus which can be expressed through an opening, generally just within the margin of the prepuce. They may become fibrous cords or they may remain patulous and relapse under unusual sexual excitement. Their discharge is capable of setting up an urethritis in another. Frequently during an attack of acute urethritis, abscesses of the size of a pea form beside the frenum. They are likely to fill and burst several times during the attack.

What is the treatment of folliculitis?

Obliteration of the follicles and their ducts. This can often be done by pressure (sound), which will also evacuate their contents. When there is a considerable pocket of pus the duct may be dilated with a small probe and the sac thoroughly emptied. Carbolic acid or silver nitrate should be applied to the sac and duct with the probe, in the hope that it will produce obliterating inflammation. Where the nodules are favorably situated, extirpation is the best treatment. The minute abscess tubes on the side of the penis can be obliterated by the insertion of a delicate wire coated with fused nitrate of silver.

What are juxta-urethral sinuses?

Little abscess tubes opening upon the papillary surface of the meatus. The magnifying-glass shows the openings through

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which the slight discharge smears the lips of the meatus, which may be taken for gleet.

What is the treatment of juxta-urethral sinuses ?

The sinus may be obliterated by pressure, but usually requires more radical treatment. Either the injection of a solution of nitrate of silver—60 gr. to 1 oz. of water—to obliterate the tube by inflammatory reaction of its walls, or splitting them with a knife, will cure the trouble.

Describe inflammation of the lacuna magna.

The lacuna magna often remains chronically inflamed after gonorrhea, maintaining a gleet discharge which has no disposition to cease and furnishes a focus for reinfection of the entire canal.

What is the treatment of inflammation of the lacuna magna ?

Introduce a fine director into the urethra, hugging the roof until its point catches in the pocket, and then with a delicate knife divide its floor. Keep the urethra clean with anterior floodings with a soft catheter, using mild antiseptic solutions.

Describe peri-urethral abscess or phlegmon.

Suppuration of a follicle may occur at any point along the course of the urethra and, involving the cellular tissues, produce a peri-urethral abscess. Abscesses are more likely to form beside the frenum and at the peno-scrotal angle.

What is the treatment of peri-urethral abscess ?

Incision as soon as there is fluctuation. The cavity should be cleansed and packed so as to force healing from the bottom.

What is lymphangitis ?

An inflammation of the lymphatics of the penis. Either the trunks or the reticular network, or both, may be involved.

When the trunks are involved they can be traced as reddish lines along the dorsum or sides of the penis. Palpation shows hard cords which can be lifted from the adjacent tissue and which are tender to pressure.

When the reticular network is inflamed, the foreskin be-

comes red, swollen, very tender, and phimotic. The lymphatic trunks and glands in relation with the prepuce are usually congested.

What is the treatment of lymphangitis?

Rest in bed, free purgation, elevation of the genitals, full hot baths, hot fomentations, hot solutions of lead and opium, surgical cleanliness. Pus should be evacuated by free incision.

What is adenitis?

An inflammation of the lymphatic glands. When occurring in the inguinal chain it is commonly called bubo. Bubo occurs about once in every 280 cases of clap. The glands directly under Poupart's ligament are most often affected.

What are the symptoms of bubo?

Tenderness and pain in the region of the groin, which is increased by standing or walking. Palpation shows one of the glands to be enlarged and surrounded by some inflammatory thickening, although it is movable and the skin above it not reddened. The symptoms usually disappear as soon as the urethritis which is feeding the gland with poison subsides. Rarely the inflammation increases, the tumid gland with the underlying fascia and skin form a mass, the skin reddens, and fluctuation in the center of the mass indicates that pus has formed.

What is the treatment of bubo?

Rest in bed, with an ice-cap applied or a shot-bag held in place with a compress bandage. If this treatment is not efficacious and suppuration seems inevitable, either nucleate at once, or promote softening by fomentations until fluctuation is apparent, then open the abscess with a bistoury and pack the pocket with sterile gauze.

What is Cowperitis?

An inflammation of Cowper's glands. These glands are two small and rounded and somewhat lobulated bodies of a yellow color, about the size of a pea, placed behind the forepart of the membranous portion of the urethra between the

two layers of the deep perineal fascia. They lie close to the bulb and are inclosed by the transverse fibers of the compressor urethræ muscle.

The swelling from inflammation of these glands causes great pain in the perineum, which is aggravated by walking and by friction of the clothing. A pyriform mass, the size of a bean, is felt upon either side of the median line, with its apex connected with the bulb. Swelling of these glands causes difficult urination.

What is the treatment of Cowperitis ?

Early applications of hot fomentations to the perineum, hot hip baths, hot rectal injections, and, if needed for pain, opium suppositories. The buttocks should be elevated and the legs separated. If abscess forms, it should be incised and drained.

Describe chronic gonorrhea.

An inflammation of the urethra which results from the failure of complete resolution of an acute attack.

It may exist in either the anterior or posterior urethra, or both. A particularly severe acute attack, gouty or strumous diathesis, or inflammation of the follicles, the presence of polypi, predisposes to it. It may also depend upon sexual or alcoholic indulgence during the decline of the acute disease, or upon injections that are too strong.

What is gleet ?

A chronic mucopurulent discharge resulting from a catarrhal or granular inflammation of the urethra limited to small localized areas. The discharge may consist of but a single drop or of several drops of greenish pus, the accumulation of the night, or there may be only a gluing of the lips. Stricture is frequently but not necessarily associated with gleet. Where stricture is present the granular spots furnishing the gleety discharge are found just above the constriction. A prominent symptom is the presence of Tripper-faden in the urine.

Describe Tripper-faden.

There are five varieties, existing alone or in combination—

small granular flakes, threads, tadpole shreds, angular pieces, and cottony shreds.

The small granular flakes, made up of pavement epithelium and pus cells, are light, settle slowly in the glass, and are from the anterior urethra.

The threads look like cotton threads, white, dense, and varying in length. They settle quickly and are composed of a dense aggregation of pus cells. They are from the anterior urethra. When they contain gonococci, double staining establishes the fact.

The tadpole variety has a head which is formed by the pus from a granular spot or inflamed follicle, the tail forming along an inflamed line of the urethra or in a fold of mucous membrane. These usually come from the deep urethra.

The angular pieces are not threads but masses of pus. They settle quickly and indicate chronic inflammation at the triangular opening or the presence of a stricture.

The cottony shreds consist of striated mucus entangling in their meshes leukocytes, prostatic round cells, squamous epithelia, some bacteria, but never gonococci. These shreds float a long time and may even rise to the top. They are not infrequently dissolved. They are found in clear urine. They come from the prostatic sinus.

What is the two-glass test?

A method of determining the source of pus in the urine. Have the patient urinate into two glasses. The first glass, to contain about two ounces, will hold the washings of the *entire urethra*, anterior and posterior. The second, if cloudy with pus, either shows sufficient posterior involvement to have furnished pus enough to tinge the entire vesicle contents by flowing back into the bladder, or indicates that the source of the pus supply is above the bladder neck, in the bladder, ureter, or kidney, in which case the contents of the first glass is but little more purulent than the second. If the urine in the second glass is perfectly clear it does not necessarily exclude the posterior urethra, because the urine in the first glass washed the posterior as well as the anterior urethra; but if the anterior urethra down to the bulb is washed by means of a soft rubber catheter and a weak solution of boracic

acid and the contents of the first glass is still cloudy, the posterior urethra is the segment involved.

What is the injection test?

The patient not having urinated for some time injects his *anterior* urethra with a 1:500 solution of permanganate of zinc. The injection is retained for half a minute. After about half an hour he should pass his urine in a clean glass. If some of the shreds are colored brown, it is evident that the spots yielding these scabs are located in the anterior urethra.

If the bulbous bougie is passed, on withdrawal there will be found colored clots of pus clinging to its shoulder, squeezed from the urethral wall, having been too closely adherent for the urine to wash away.

What is the endoscopic test?

If the back part of the sinus of the bulb seen through the illuminated endoscope appears to be livid in color, or bleeding, up to the hole in the triangular ligament, posterior urethritis is present. The condition of the anterior urethra may also be ascertained through the endoscope.

What is the pathology of chronic anterior urethritis?

An infiltration of small round cells following an acute gonorrhea. It begins in the submucous connective tissue and surrounds the lumen of the urethra completely. It is most frequently found in the bulb, the fossa navicularis, the glands, and crypts.

The inflammation may be superficial, the round cells being limited to the mucous membrane, subepithelial connective and periglandular tissue, or it may involve the meshes of the corpus spongiosum and form a stricture.

What is the treatment of chronic anterior urethritis?

First eliminate strong injections, coitus, alcoholism, and excessive exercise as possible causes of the failure of complete resolution. If there is stricture, follicular abscess, or granular spots, each has its selected treatment, which is given elsewhere.

In cases where there is morning drop or a return of the discharge, as soon as the injections are stopped, a catarrhal

and exudative condition of the canal is present, and direct applications of silver solutions should be made through the endoscope by means of a delicate swab. These applications may range from 6 to 15 grains to the ounce of water, and may be given as often as twice a week in conjunction with mildly astringent injections. If the foregoing treatment fails the sound and irrigations should be employed.

When and how is the sound used ?

The sound should be used in cases in which the urine shows no pus and the posterior urethra is sufficiently tolerant. A sound the full size of the meatus, warmed and anointed, should be passed twice a week. If the disease is limited strictly to the anterior urethra, the sound need not pass the cut-off muscle. Sounding stimulates the circulation in the infiltrated tissues and empties the pus from lacunæ and follicles. If the meatus is too small to allow the passage of a sound large enough to fully dilate the urethra, a meatotomy should be done.

Describe irrigations for chronic anterior urethritis.

A clean soft rubber catheter (No. 12 French) should be inserted as far as the bulb ; a 4-ounce hard-rubber syringe is coupled to the catheter and the medicated fluid slowly thrown into the canal. The fluid will trickle out of the eye of the catheter at the bulb, wash out that enlarged portion of the urethra but not pass beyond the cut-off muscle, and finally follow along the catheter to the meatus, thus cleansing the entire anterior urethra. These retro-injections may be given daily. The 4-ounce syringe may be emptied a number of times at a sitting. The following solutions are excellent for retro-injections of the anterior urethra. They should be used as hot as the patient will permit :

R Normal salt sol., q. s.
Sig.—Use as a retro-injection.

R Alum, crude,
Sulphate of zinc, āā ʒss ;
Water, ʒviij.—M.

Sig.—Add 1 part of the above to 3 parts of water and use as an injection. Increase the strength from day to day until equal parts of the solution and warm water are used.

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R Potass. permanganatis, gr. iv;
 Aquæ, $\frac{3}{4}$ viij.—M.
 Sig.—Use as described for the first formula.

R Argent. nit., gr. v;
 Aquæ, $\frac{3}{4}$ viij.—M.
 Sig.—Use as directed for the first formula.

If the urine still contains threads it indicates the persistence of damaged spots in the urethra, which should be touched with silver solutions through the endoscope by means of cotton on the end of an applicator.

Describe the endoscope.

The endoscope may be a simple urethral tube or a Klotz's endoscope, or an endoscope which is furnished with a small



FIG. 51.—Klotz's endoscope.

incandescent lamp at the distal end to illuminate the field of operation. The simpler endoscopes transmit light reflected from a head-mirror. All have an obturator. When the instrument is in place the obturator is withdrawn, leaving the tube clear for illumination. The folds of mucous membrane then fall against the opening, and, as the tube is slowly withdrawn, the infolding surface of the urethra can be inspected. If a spot is overlooked, or if deeper inspection is again desired, the obturator must be replaced before the endoscope is pushed more deeply into the urethra.

The accessory instruments are: swab-holder, caustic-holder, probes, applicators, powder-blower, forceps, scissors, and a urethral knife. All these instruments have their handles bent at such an angle that the operator's hand will not obstruct the field of vision during the manipulation.

What damaged spots are most frequently seen through the endoscope ?

Ulcerations and erosions. Both are most likely to be found in the first $2\frac{1}{2}$ inches from the meatus and upon the upper surface of the canal. They may be of any size less than that of a pea, and to induce resolution in them stronger applications than can be borne by the entire urethra must be applied directly.

Describe ulcerations.

Ulcers in the urethra entirely destroy the mucous membrane. Their edges are precipitous, clear-cut, possibly overhanging. They are slightly irregular in shape, and infiltration raises them from the level of the urethral wall. If they are recent they are covered with a grayish secretion through which granulations show. Ancient ones appear as white patches.

What is the treatment of urethral ulceration ?

After injecting a few drops of a 4 per cent. solution of cocaine into the urethra to obtund sensibility, the endoscope should be introduced and the ulceration located. The ulcer should be cleansed with dioxid of hydrogen, wiped dry by means of a cotton swab, and finally touched with a 10 per cent. solution of nitrate of silver. If the ulcer is old enough to be deeply infiltrated it should, after the preparatory cleansing, be slit by a linear incision and the silver applied.

Describe erosions of the urethra.

Erosions appear as red spots with slightly infiltrated margins. They, like ulcers, cause a prickling sensation independent of the act of urination. The treatment of erosions is practically the same as indicated for ulcerations.

What is chronic posterior gonorrhea ?

A chronic inflammation affecting that part of the urethra back of the cut-off muscle. It usually results from the failure of a general urethritis to undergo resolution in this part of the canal.

When the mucous membrane alone is involved the symp-

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toms are slight, but when the prostatic sinus, the orifice of the ejaculatory ducts, the utriculus masculinus, or caput galinaginis is inflamed, both direct and reflex symptoms are likely to be prominent. There is no discharge from the meatus unless the amount of pus formed is exceptionally large. In a man who has previously had gonorrhea a new attack is more frequently due to an extension of an unrecognized posterior urethritis than from a fresh inoculation of gonococci.

What is the pathology of chronic posterior gonorrhea ?

The histologic changes correspond to those in anterior gonorrhea, but the part of the urethra back of the cut-off muscle is rich in blood supply and glands, which increase the liability to chronic inflammation. And, too, the prostate and seminal vesicles are frequently involved. The subepithelial connective tissue becomes infiltrated with round cells, which undergo organization and contraction.

In some cases the infiltration is deep and involves the prostatic glands, sinus pocularis, and the ejaculatory ducts. The lacunæ and superficial glands are obliterated by the contraction of the connective tissue.

Strictures do not form in the posterior urethra because the sclerosis does not materially narrow the caliber of that part of the canal. The veru montanum is always enlarged, softened, and hypersensitive during chronic posterior urethritis, upon which condition sexual hypochondriasis often depends.

What is the prognosis of chronic posterior gonorrhea ?

A large majority of all cases will recover with treatment, but some neglected cases last until the prostate is seriously and permanently damaged and the ejaculatory ducts are made impervious by inflammatory deposit.

What is the treatment of chronic posterior gonorrhea ?

The regimen is the same as that for the gonorrhea of which it is the offspring.

The urine should be kept bland and the antibleorrhagics should be continued. If there is irritability of the bladder quite hot rectal injections should be used, and if the prostate

is involved in the inflammation it should be massaged through the rectum. Obstinate cases demand either irrigations or instillations, or both.

How may the posterior urethra be irrigated ?

The patient having urinated, a hard-rubber syringe, to which a No. 12 French catheter is attached, is filled with the medicated solution advised for irrigation of the anterior urethra, and the air forced out of the catheter by filling it with the fluid in the syringe. The catheter is then passed into the posterior urethra so that its eye is just beyond the cut-off muscle. In some exceptional cases it will be impossible to pass a soft catheter ; for these rare instances substitute a small woven silk catheter, which, although more rigid than the soft rubber, is flexible and less liable to set up irritation than a metal one. When the catheter is in place the fluid should be slowly and gently forced into the posterior urethra, from which it passes into the bladder. When the syringe is empty the coupler is turned off, the syringe removed, filled, attached again, and more fluid injected. This procedure may be repeated until the bladder is comfortably distended. The patient now passes the medicated fluid, which, having already acted on the posterior urethra and bladder, washes out the posterior urethra a second time as it flows out, medicating all of the congested and eroded or ulcerated spots and patches along the entire canal. The amount of fluid used at each sitting varies, the average being 10 ounces. Injections should be given two or three days apart, according to results obtained.

What if irrigation fails to cure a chronic posterior urethra ?

If after a thorough treatment by irrigation the disease persists, as shown by the presence of shreds in the urine, instillations of solutions of nitrate of silver should be used. These may be given with the syringe devised by R. W. Taylor, which is patterned after an ordinary hypodermic syringe with a conical nozzle which will fit into a small soft catheter. The catheter (No. 12 French) is cut off so as to measure eight and a half inches. The piston is so marked that the exact number of drops desired may be thrown out.

What solutions are instilled for posterior urethritis ?

Nitrate of silver ranging from 1 grain to 20 to the ounce of water, $\frac{1}{4}$ to 2 per cent. protargol solutions, $\frac{1}{4}$ to 3 per cent. sulphate of copper solutions, and 3 to 6 per cent. sulphate of thallin solutions. The preparations of silver give the best results.

The syringe is filled and the catheter attached. The air from the latter is expelled by filling it with the solution from the syringe. After a drop or two of the solution appears at the eye of the catheter, withdraw the piston a little so as to prevent dribbling from the eye while the catheter is being introduced. Now gently pass the catheter. When it is introduced six and a half inches its end is in the sinus of the bulb, and the slight impediment it encounters there shows the operator that the end of the catheter is just at the opening of the triangular ligament. The operator should then pass the catheter more deeply, so as to engage its eye in the beginning of the prostatic urethra, where the concentrated solution is deposited. The treatment should be used every four days by the surgeon: it is dangerous in the hands of the patient.

Describe the method of Ultzmann.

The instrument is like a hypodermic syringe, armed with a hollow shaft similar to a small silver catheter. The shaft

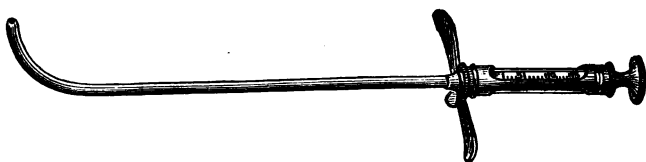


FIG. 52.—Keyes-Ultzmann syringe.

is passed like a sound just beyond the cut-off muscle and the solution deposited drop by drop.

When using this syringe, as with the Taylor syringe, care should be taken that the solution is deposited behind the cut-off muscle, for if it dribbles anteriorly it is liable to create considerable inflammation in the pendulous urethra. Generally five to fifteen drops are used at a time. The instillation

should be given when there is some urine in the bladder, so if the reaction is too severe the patient can urinate and thus neutralize the solution. The results following instillation are prompt and the pain and tenesmus produced are often quite severe. The distressing symptoms soon subside, however, and a sense of comfort follows. If the reaction is very severe, hot applications to the perineum and rectal suppositories are called for. If the instillation (etching) is to be beneficial, good results will follow the first application, and the report of the patient will confirm the efficacy of the treatment.

What are the sequelæ of chronic posterior gonorrhea ?

Frequent desire to urinate, cystospasm, inelastic urethra, and disturbance of sexual function.

How is urination affected ?

The demand to urinate is too frequent ; it is imperative ; there is a moment's hesitation in its beginning, and it is followed by a feeling of incompleteness and discomfort. Judicious soundings usually bring about a cure.

What is cystospasm ?

A contraction of the bladder neck during urination, which sometimes persists for weeks after the other symptoms of posterior urethritis have ceased. The pain from it may be dull and heavy, or an acute paroxysm radiating to the rectum, testicles, and groins. The spasm of the cut-off muscle may interrupt the flow of urine. The cold sound and mild instillations are usually all-sufficient to bring about a cure.

What is inelastic urethra ?

Chronic inflammation may result in infiltration of the urethral connective tissue, so that it is no longer distended during micturition, and, the pressure of the urine at the meatus being diminished, the stream is neither smooth nor forceful. The cold sound usually cures this condition.

How does chronic posterior gonorrhea affect the sexual function ?

There may be absence of sexual desire, or the orgasm

may be attended with little pleasurable sensation, and in some cases it is painful. Erections are often feeble, and ejaculation occurs prematurely or not at all. In other cases there are nocturnal pollutions, which may be bloody if the ejaculatory ducts are hyperemic. In this condition patients become hypochondriacal and ready victims of quacks.

What is the treatment of disturbance of the sexual function due to chronic posterior gonorrhea ?

The patient being hypochondriacal it is wise to give assiduous attention to his "tale of woe" as well as to his physical condition. The several sequelæ which affect the genesic function have been discussed individually in previous paragraphs.

How may boys acquire gonorrhea ?

In most cases the infection is direct from coitus.

Exceptionally infection is mediate by means of fabrics or by foreign bodies previously contaminated coming in contact with the meatus or gaining entrance to the urethra.

Urethritis in boys is very rare under the age of twelve and presents no clinical features that are not seen in the adult.

What are the complications of gonorrhea in the boy ?

Balanoposthitis, lymphangitis, and epididymitis. The first is very common ; the second fairly so, because the foreskin at this age is always redundant and often tight ; the third rare.

What is the treatment of acute gonorrhea in the boy ?

Surgical cleanliness is necessary to prevent balanoposthitis. The treatment of the disease and its sequelæ is the same as that for adults.

What is abortive urethritis ?

An inflammation of the urethra that does not become very severe is self-limited and usually ceases in ten days or two weeks. It is often called "bastard clap." The discharge does not contain gonococci.

What are the symptoms of abortive urethritis ?

The meatus is blushing and yields a slight discharge of pus

from the anterior urethra. There is a slight tingling during urination, but it is not severe enough to be called *ardor urinæ*. The inflammatory infiltration of the urethra is not sufficient to cause *chordee*.

There are neither complications nor sequelæ unless *balanitis* results from lack of cleanliness.

The slight inflammatory symptoms which were present from the beginning, instead of increasing remain stationary, and if not too vigorously aggravated by injections subside in about a week. This variety of urethritis is responsible for many reports of quick recoveries of gonorrhea under special forms of treatment.

What is the treatment of abortive urethritis?

The patient should be advised against rich foods and severe exercise. If he demands an injection, give him a weak antiseptic solution. Strong injections aggravate and prolong this trouble. If he wants an internal remedy, give him *buchu-leaf tea*.

Describe the urethra.

The urethra is a collapsed tube leading from the bladder to the meatus, serving as an excretory duct for the removal of the urine, as a channel for the egress of the seminal fluid, and also as a gen-

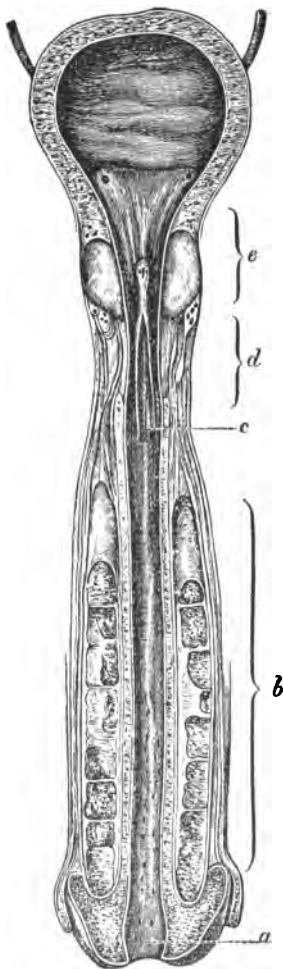


FIG. 53.—*a*, Fossa navicularis; *b*, cavernous portion; *c*, bulbar enlargement; *d*, membranous portion; *e*, prostatic portion (Finger).

ital organ in supplying by means of its glands a mucous fluid which takes part in the composition of the semen. The male urethra is made up of three layers: the internal or mucous layer, the middle or submucous layer, and the external or muscular layer. The urethra is about 8 inches long, and for descriptive purposes is divided as follows: The spongy, pendulous, or penile portion, the membranous portion, and the prostatic portion.

Describe the pendulous portion.

This portion is about 6 inches long, beginning at the meatus and ending at the bulb.

What is the fossa navicularis?

It is the first dilatation of the pendulous urethra and is situated within the glans penis.

What is the bulb of the urethra?

The dilated upper end of the spongy portion. It contains the two orifices of Cowper's ducts; the glands themselves are situated between the anterior and posterior layers of the triangular ligament in the substance of the compressor urethræ muscle.

What is the lacuna magna?

A mucous follicle situated on the roof of the penile urethra about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch from the meatus. It is the largest follicle in the urethra and consists of a valve-like reduplication of the mucous membrane.

What are the glands of Littre?

They are mucous glands and follicles opening into the urethra with their orifices toward the meatus. They are found principally on the floor of the canal in the first 4 inches of its length.

Describe the membranous portion of the urethra?

This portion lies between the bulb and the apex of the prostate. Its upper surface is $\frac{3}{4}$ of an inch long and its floor $\frac{1}{2}$ an inch long, in consequence of the bulb projecting

backward beneath it. Its upper concave surface is placed about 1 inch beneath the pubic arch, from which it is separated by the dorsal vessels and nerves of the penis and some muscular fibers. Its lower convex surface is separated from the rectum by the perineum. On the side of the membranous portion of the urethra are the ducts of Cowper's glands on their way to open into the bulb of the urethra.

The walls of the membranous urethra are very thin and almost destitute of erectile tissue, and except at the orifice this portion is the narrowest of the entire canal. The membranous portion is surrounded throughout its entire length by muscular tissue, and is therefore often the seat of spasmodic stricture which may oppose the passage of instruments into the bladder.

What is the cut-off muscle ?

This muscle (also called the compressor urethræ muscle, or the constrictor urethræ muscle) covers the membranous urethra and controls the act of urination. The natural condition of the cut-off muscle is that of tension, more or less modified by excess and disease. The muscle acts as a valve, preventing fluid injected from the meatus from entering the bladder. This resistance can, of course, be overcome by sufficient pressure.

Describe the prostatic portion of the urethra.

This portion begins at the end of the membranous portion and terminates in the bladder neck. It is situated in the prostate gland from its apex to its base and is about $1\frac{1}{4}$ inches in length. It is of spindle shape and is the widest and most dilatable portion of the entire canal.

The prostatic urethra tunnels the prostate gland, sometimes barely covered by that organ above, sometimes deeply embedded in it. It is fixed only where it joins the membranous urethra. The roof and the lateral walls of the prostatic urethra are smooth and pierced by but few ducts. The floor consists of two lateral portions, in which the prostatic ducts open, and a central, irregular part. The central portion rises gradually from behind forward to form a little mound, the verumontanum (colliculus seminalis—caput gallinaginis). In

the anterior slope of the verumontanum is a little cavity, the sinus pocularis (utricle), the analogue of the uterus. The ejaculatory ducts open on the edge of the sinus. On either side of the verumontanum is a slightly depressed fossa, the prostatic sinus, the floor of which is perforated by the orifices of the numerous prostatic ducts, the ducts of the middle lobe opening behind the verumontanum.

Why is inflammation in the prostatic urethra dangerous?

Because the disease may attack the seminal vesicles, testicles, and prostate gland through their respective ducts, which are in direct communication with this portion of the urethra.

What parts of the urethra are mobile?

The anterior portion of the canal when in the flaccid state is capable of assuming almost any position. Its posterior third is connected with the symphysis by means of the suspensory ligament and with the anterior layer of the deep perineal fascia by means of the bulb, and is therefore fixed in proportion as it approaches the membranous region.

The membranous region is the least movable of all, owing to its firm connection with the pelvis by means of the two layers of deep perineal fascia.

The prostatic portion is susceptible to some slight change of position depending upon the action of the anterior fibers of the levator and upon the amount of urine in the bladder.

How many curves has the urethra?

In the flaccid state of the penis the urethra has two curves, an anterior curve and a posterior curve.

Describe the anterior curve of the urethra.

The anterior curve is confined to that portion of the penis in front of the symphysis. This curve is due to the dependent position of the flaccid anterior portion of the organ. During an erection, or when the organ is elevated to an angle of 60 degrees with the body, it disappears.

Describe the deep curve of the urethra.

The deep curve of the urethra is below and behind the symphysis. It is also called the subpubic curve. This

curve is permanent unless distorted by force. It commences $1\frac{1}{2}$ inches anterior to the bulb and attains its lowest point, when the body is erect, nearly opposite the anterior layer of

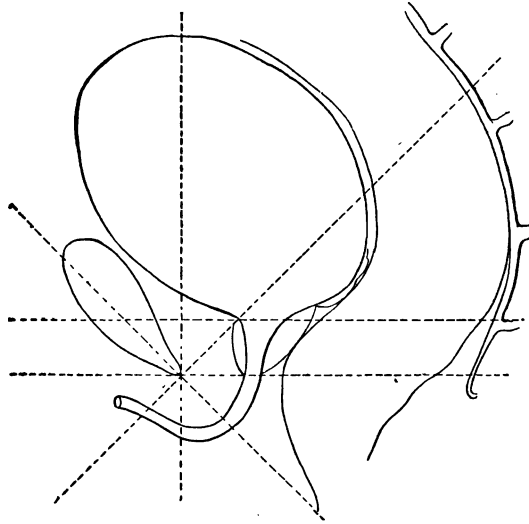


FIG. 54.—Schematic representation of urethral curve and its relation to the symphysis pubis (Tillaux).

the deep perineal fascia, and finally ascends through the membranous and prostatic regions on its way to the bladder.

STRICTURE.

What is stricture of the urethra ?

An abnormal narrowness of a portion of the canal.

How may stricture be classified ?

Into muscular or spasmodic, traumatic, and organic.

Describe spasmodic stricture.

Spasmodic stricture is due to the sudden contraction of the compressor urethræ muscle, or the circular muscular fibers of

the urethra itself. The spasm may be from the irritation caused by passing instruments; from sudden chilling of the body (retention of urine by the spasm), from shame or fear, as when a patient is requested to pass water before a class or even in the presence of the examining surgeon.

What is the symptom of spasmodic stricture?

The inability to pass water from the bladder. The spasm is frequently met with during sounding, and is often mistaken for organic stricture.

What are the differential points of spasmodic stricture?

Spasmodic stricture can only occur in the membranous urethra. When organic stricture is not associated with it the urine has no adventitious substances, and comes away sparkling and normal in color. Spasmodic stricture will resist a small sound, but when the end of a sound large enough to comfortably fill the meatus is held firmly against it, it soon relaxes, permitting the instrument to pass on into the bladder. There is no resistance to withdrawal of the sound as in organic stricture; spasmodic stricture disappears at once under anesthesia. In all cases of spasm of the cut-off muscle organic stricture should be sought for, because it is the most common cause.

What is the treatment of spasmodic stricture of the urethra?

Hot applications to the abdomen, perineum, and genitals. The hypodermic injection of $\frac{1}{4}$ grain of morphin usually deadens the patient's sense of irritation upon which the spasm depends, so that urine may be voided naturally. In grave cases a general anesthetic should be administered to relax the muscles so as to allow the introduction of a catheter. Rarely it is necessary to perform suprapubic aspiration or perineal section.

The cause of the spasm should be sought and removed.

To prevent recurrence the urine should be kept unirritating, sounds should be passed twice a week, and instillations of nitrate of silver may in certain cases be used to cure deep urethral irritation.

What is traumatic stricture ?

A stricture caused by violence. The lymph deposit during the inflammation incident to a laceration or contusion of the urethra may encroach upon the lumen of the tube, constituting a stricture.

What is the most frequent seat of traumatic stricture ?

The perineal urethra, which is most exposed to injury.

What is organic stricture ?

A cicatrix of the urethral wall narrowing its caliber—the sequel of an inflammation—which encroaches upon the lumen of the tube and shows a disposition to contract.

How may organic stricture be classified ?

For the purpose of description, into linear, annular, diaphragmatic, bridle or crescentic, resilient, irritable, inflammatory, strictures of large caliber, strictures of small caliber, impassable stricture except to a filiform bougie, and impassable stricture.

What is a linear stricture ?

One that appears as a slight cord-like band forming a ring just beneath the mucous membrane and circling the urethra partially or completely.

What is an annular stricture ?

A ring-like constricting mass wider and deeper than the linear stricture. It may be quite irregular or tortuous.

What is a diaphragmatic stricture ?

It is a fold of mucous membrane through which the urine passes. The opening may be concentric or excentric.

What is a bridle or crescentic stricture ?

A fold of mucous membrane which bulges into the urethral canal.

What is a resilient stricture ?

One that, owing to its elasticity, immediately contracts to its former size after dilatation.

What is an irritable stricture ?

A transitory tumefaction of the urethral mucous membrane from mechanical or chemic violence. It is oftenest seen after the unskilled use of urethral instruments.

What is a stricture of large caliber ?

One that admits a No. 15 (French) sound or larger.

What is a stricture of small caliber ?

One that will not admit a No. 15 (French) sound.

What is an impassable stricture except to filiforms ?

One that will not admit the smallest metal sound, but through which after patient and skilful manipulation a filiform bougie may be passed.

What is an impassable stricture ?

One that is impermeable to any sort of instrument.

What is the essential lesion of stricture ?

A more or less extensive, small round-celled infiltration into the submucous connective-tissue layer, which causes a chronic catarrhal condition of the mucous membrane. The tendency of this infiltration is to become organized and to contract, lessening the size of the urinary tube. In chronic anterior urethritis the submucous exudation is likely to remain as an infiltration of small round cells, which may form soft stricture.

Semi-fibrous stricture is a cicatricial tissue in which the round cells have become fusiform.

Fibrinous stricture is the result of a continuation of the morbid process, in which the erectile and vascular tissues become sclerotic. On section such strictures are seen to be white, firm, and homogeneous in structure.

What is the effect of stricture upon the urethral canal ?

Behind the stricture the urethra is generally enlarged in consequence of the obstruction of the urinary flow. Dilatation from this cause in the deep urethra may be so great that a bulging appears in the perineum during micturition.

Directly behind the stricture an ulcerating surface is usually found which furnishes the characteristic discharge.

The mucous membrane behind the stricture is thickened and thrown into folds or thinned, showing hyperemic vessels. Abscesses resulting in fistulæ may be caused by urine being forced into the mucous membrane through the bases of deep ulcers by increased lateral pressure.

What part of the urethra is most liable to stricture ?

The largest number of strictures is found in the bulbomembranous portion ; a considerable number within two and a half inches of the meatus ; a few in the middle of the spongy portion.

What are the general symptoms of organic stricture ?

The persistent symptom is gleet. At any time except directly after urination a drop can be milked from the meatus. This drop may be clear viscid mucus and be noticeable only in the morning just within the lips of the meatus, which are glued shut, or it may be creamy in appearance, the pus coming from an ulcer behind the stricture.

Either mucous discharge or that mixed with pus is liable to be exaggerated by coitus, violent exercise, irritating urine, or inebriation, so that a relapse of the clap will occur. In purulent gleet the frequency of urination is increased ; the stream of urine is distorted and its force diminished ; if the lumen of the stricture is less than that of the meatus the force of the stream is decreased during micturition, and there is often a dull pain in the perineum, back, or loins. The urine may dribble away and sharp pains be felt radiating from the neck of the bladder.

Erections may take place and nocturnal emissions occur, or erections may be feeble from obstruction to the circulation of the corpora cavernosa or to rigidity of the urethra from in-

flammatory deposit. Pain may occur during the sexual act and ejaculation may be imperfect.

What is a very useful instrument in the diagnosis of stricture?

The *bougie á boule*. It may be made of metal or of soft

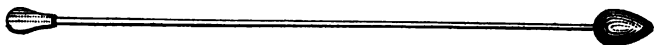


FIG. 55.—Bulbous bougie.

material. It comes in various sizes and consists of an olive-shaped tip with a slender handle about 10 inches long.

What facts should be in mind while using the bougie á boule?

That the spongy portion of the urethra is the narrowest except the meatus, and the least dilatable part of the canal; that in health it can be safely dilated to No. 32 (French), while the average meatus will admit a No. 28 (French); that the urethral canal is narrowest at the meatus, is dilated at the fossa navicularis, and then forms a nearly cylindric tube as far as the bulb, where it again becomes larger.

What is the method of using the bougie á boule?

Grasp the penis behind the glans with the thumb and index finger of the left hand. The dorsum of the penis should face the abdomen and the foreskin be retracted. Grasp the handle between the finger and thumb of the right hand and gently insert the olive point into the meatus and use as you would a sound.

When the stricture is reached there will be resistance. Slip the right hand down to the meatus and place the thumb on the handle on a level with that opening. Withdraw the bougie and measure the distance between the olive point and the place on the handle marked by the thumb. This gives the distance of the anterior margin of the stricture from the meatus or, in other words, its depth in the urethra. Re-introduce the bougie and pass the olive point through the stricture to the cut-off muscle. Gently withdraw it. Notice

the resistance. This resistance identifies the posterior margin of the stricture. The distance from the meatus can be measured as for the anterior margin. The distance between the two measurements gives a fairly correct idea of the length of the stricture from the anterior to the posterior border, and the size of the olive an idea of the degree of the constriction.

What is the constitutional treatment of organic stricture of the urethra ?

The urine should be kept bland and unirritating, modifying its reaction by acids or alkalis as indicated. The diet should be simple ; highly seasoned foods, such as salted meats, cabbage, cheese, and tomatoes, being prohibited. Constipation should be corrected and tonics for the general health should be given. Hot hip baths should be used if there is much inflammation. The strumous should be given cod-liver oil.

What instruments are used in treating organic stricture ?

The first effort in instrumental interference is usually with bougies and sounds for the gradual dilatation of the stricture. Cutting instruments are used only after efforts at dilatation have failed, except in impermeable stricture. The endoscope and cystoscope are useful to obtain a view of the diseased area in the interest of a correct diagnosis.

How are the dangers of urethral instrumentation avoided ?

By the utmost surgical cleanliness of the patient, instruments, and hands of the operator. The patient should be placed upon a milk diet for twenty-four hours before any severe operation on the urethra, and the urine should be rendered unirritating by the administration of such drugs as salol, boracic acid, urotropin, alone or in combination, to the amount of 15 grains daily.

What care should be given urethral instruments ?

All instruments for use in the urethra should be perfectly smooth and highly polished, since any roughness will abrade the mucous membrane of the urethra and expose the patient, through such abrasion, to the dangers of sepsis and urinary

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fever. Instruments before introduction into the canal should be well lubricated. The lubricant must be aseptic.



FIG. 56.—Sound.

Sounds should be kept separated so that they will not abrade one another, and should be boiled for at least five



FIG. 57.—Soft-rubber bougie.

minutes before and after use. A pinch of soda added to the water renders them less liable to rust.

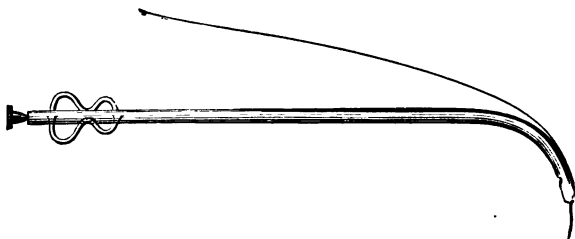


FIG. 58.—Gouley's catheter-staff.

Urethrotomes, tunneled sounds, lithotrites, silver catheters, and endoscopes should be scrubbed with a brush in hot water

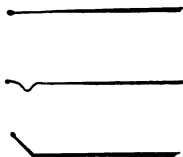


FIG. 59.—Filiform bougies.

and rubbed with alcohol. Soft-rubber catheters can be boiled for a limited number of times if they are wrapped in

several thicknesses of gauze and the water brought to a boil after immersion. Instruments which boiling would injure, such as elastic bougies, catheters, and filiform guides and cystoscopes, may be washed with soap and dried with gauze and sterilized with a solution of formalin. Delicate knives should be dipped in carbolic acid, cleansed with distilled water, and rubbed with alcohol just before using.

How are sounds effective in the treatment of stricture ?

The benefits of the use of the sound depend upon mechanical distention—reactionary hyperemia, with increased local tissue change. The activity of the lymphatics and veins is increased and absorption takes place. It is obvious that a full-sized sound must be used. Frequently the meatus is so small that a sound sufficiently large to stretch the canal beyond cannot be introduced. Meatotomy is necessary under such conditions.

What is meatotomy ?

Enlarging the meatus by cutting. The meatus and canal for an inch above should be cocainized by the introduction of a plug of cotton saturated with a 4 per cent. solution. It should be done with the utmost surgical cleanliness. The line of incision should be made by a single cut along the floor of the urethra, beginning well back in the canal ($\frac{1}{2}$ to $\frac{2}{3}$ of an inch), and sufficiently deep to admit a sound of the required size. The cut closes rapidly (even when there is considerable discharge at the meatus) and the opening must therefore be kept patulous by daily dilatation until healing is complete. A meatus admitting a No. 16 sound can be cut to accommodate a No. 34. The meatus should be cut two sizes larger than the size determined as normal to the urethra, as contraction follows the operation.

How is the sound used ?

The patient should be in the recumbent position with the shoulders sufficiently elevated to relax the abdominal muscles, the knees a little separated, the genital organs entirely exposed, and trousers and drawers pushed below the knees.

The surgeon, standing on the patient's left, retracts the foreskin, wipes the glans, and puts the penis on the stretch with

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the fingers of the left hand. The sound is held in the right hand, at the flattened part, by the thumb above and the fore

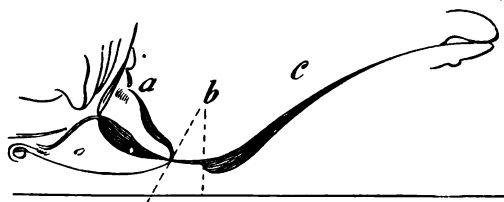


FIG. 60.—*a*, The prostatic; *b*, membranous; and *c*, spongy portions of the normal urethra (Thompson).

and middle fingers below—like a pen—and parallel with and the knuckles touching the groin and the tip of the sound en-

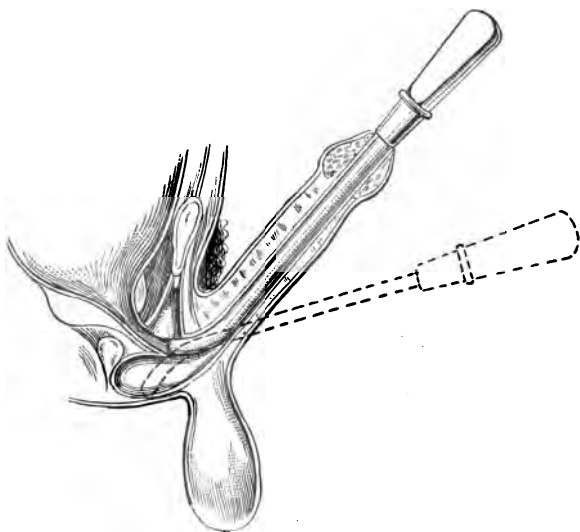


FIG. 61.—Relative positions of triangular ligament and bulb of urethra (diagrammatic, from Culver and Hayden).

gaged in the meatus. The penis is drawn upward and made to swallow the sound, which passes almost by its own weight.

After 4 or 5 inches of the sound have passed into the urethra the fingers of the left hand should be shifted to the perineum, where the sound will be felt behind the scrotum.

As the point passes under the pubes, the handle of the sound should be moved to the median line of the patient's body, still held close to the abdomen, while the point is pushed inward so as to pass into the membranous urethra. If the handle is raised too soon the point strikes the subpubic ligament above the orifice; if the handle is not raised soon enough the tip passes down into the elastic floor of the bulbous urethra. In either case the curve of the sound bulges in the perineum. The withdrawal of the instrument for an inch and the raising or lowering the handle will make the point engage.

Then the handle of the sound should be raised to the perpendicular, making the tip hug the pubic bone, and as the instrument moves forward pressure should be made with the disengaged hand upon the root of the penis for the purpose of stretching the suspensory ligament to reduce the curve of the canal. The handle may be then pressed downward between the thighs while the tip enters the bladder.

What are the different scales of urethral sounds?

The American, French, and English.

The French scale should be used because the intervals are the smallest. The number indicates the millimeters in the circumference of the instrument. To convert the French to the American scale subtract one-third; to convert French to English subtract one-third plus three; for example, 30 French equals 20 American and 17 English.

What is gradual dilatation?

The process of restoring the urethra to its normal caliber by the use of sounds. The instruments required for gradual dilatation of stricture are a set of tunnelled catheters running from No. 8 to No. 18 French, a set of steel sounds, and a bunch of filiforms. In dilating strictures passable only to filiforms, the urethra must be filled with sweet oil. The bougies should be introduced at the meatus, hugging the floor for the first 2 inches so as to avoid the lacuna

magna. If the first filiform bougie fails to enter the stricture, the penis being on the stretch, others must be introduced alongside the first. After a number have been so placed, each in turn should be lifted a little and the direction of its point changed by twisting, and the attempt to pass the constricted orifice continued. One will finally slip through. The others are then withdrawn. In some cases the filiform may be left in overnight. This will permit urine to dribble away. In the morning the stricture may have yielded so as to admit another filiform readily.

If the bladder is not relieved a tunnelled catheter must be threaded over the filiform and forced through the stricture. Using the filiform as a guide obviates the danger of making a false passage. The laceration of the mucous membrane incident to the forcible passing of the catheter is too slight to be dangerous. There may be considerable bleeding, however.

The tunnelled catheter may be tied in the bladder overnight to maintain the opening, and subsequently sounds of increasing size should be passed every fourth day until the normal caliber of the urethra is restored. Subsequently it is necessary to pass the largest-sized sound used about every two weeks for a number of months to prevent recontraction.

What is the procedure in the presence of a false passage ?

A false passage may be avoided by turning the point of the instrument to the other wall of the urethra or by filling the urethra with filiforms. These may be made to bridge over the opening when the sound may be pushed along the urethra, avoiding the tear.

A new false passage does not give the sense of resistance that is felt when the instrument is engaging the stricture. In the absence of resistance the operator should not continue the sound in its onward course.

What is the treatment of false passage and extravasation of urine ?

When there is no appearance of blood at the meatus, but difficult urination with perhaps retention, and there is no evidence of extravasation, abscess or fever, and when catheterization is easy, the surgeon should empty the bladder regu-

larly and watch for the onset of fever or the appearance of localized swelling.

When there is urethral hemorrhage with retention of urine or evidence of extravasation, and catheterization, though difficult, is possible, it is best to tie a full-sized catheter in the bladder, and if there is extravasation to lay open freely the tissues involved.

Where catheterization is impossible, perineal section should be done, the rent in the urethra sought for, and a catheter passed through it into the bladder.

If the proximal end of the torn urethra cannot be found, suprapubic cystotomy for the purpose of retrograde catheterization should be done at once.

What causes urinary abscess?

Unrelieved urinary infiltration. External perineal urethrotomy should be done as soon as the condition occurs. The incision should be made in the median line, including the abscess and stricture. Success in closing the wound depends upon early and thorough evacuation of the abscess.

What is urinary fistula?

The channel or false passage made by the escape of urine.

What is the essential step in the treatment of fistula complicating stricture?

Removal of the obstruction to the free escape of urine.

A fistula is likely to contract and heal spontaneously if the stricture is well dilated so as to give free vent to the urine by way of the natural passage. If urine dribbles from the fistula for several months after full dilatation the patient should be taught how to use the soft catheter, so as to allow no urine to pass through the false passage. If the opening does not close within two months the hard edges of the fistulous tract should be incised and freshened and the tract left with its external orifice larger than its internal. The introduction of the galvanocautery wire and raising it suddenly to a white heat has been successfully used in urethral fistulæ. Another method is to bend a silver probe until it readily traverses the whole of the tract. The probe is then with-

drawn and coated with fused nitrate of silver, reintroduced, rapidly rotated, and withdrawn. Maintaining by the use of sounds the full caliber of the urethra—so that there may be the least possible pressure of the urine at the false opening—is of paramount importance in the treatment of fistula.

What is the treatment of numerous fistulæ of the urethra which open at many points ?

In neglected cases where there has been much burrowing around the penis, scrotum, and perineum, the tracts are indurated and may be lined by calcareous deposit, or there may be abscesses. Such cases are incurable, except by external perineal urethrotomy. The incision should be central, all abscess pockets and fistulous tracts being opened and forced to heal from the bottom.

What is the treatment of fistula opening into the rectum ?

When a fistula opens into the rectum the obstacle to successful treatment is the passage of fecal matter into the urethra. If after cure of the stricture, simple means (cautery or incision) fail, a plastic operation of the rectal mucous membrane should be performed.

Enumerate the several operations for stricture.

Internal urethrotomy, external urethrotomy, and perineal section.

Describe internal urethrotomy.

The patient being anesthetized, the urethrotome is passed through (below) the stricture, say, $\frac{1}{2}$ inch beyond it. The knife blade, which is concealed in the instrument, is exposed. After the blade has been exposed it is carefully withdrawn, the knife cutting through the roof of the stricture, thus dividing it. When all resistance ceases (showing that the knife has passed through the strictured portion) the blade is drawn back into the instrument, which is then removed. A sound is passed to ascertain that all constricting bands are severed. It is good surgery to open the urethra by perineal section behind the stricture (between it and the bladder neck) for drainage in cases of internal urethrotomy of the pendulous

urethra, which insures against urine coming in contact with the wound in the urethra, as it passes out of the perineal opening. This may be done as follows: After internal urethrotomy has been performed the patient is placed in the lithotomy position and a grooved staff introduced into the bladder. The membranous urethra is punctured through the perineal incision $1\frac{1}{2}$ inches in front of the anus with a straight long knife having its back toward the rectum. The



FIG. 62.—Gross's modification of Civiale's urethrotome.

incision is enlarged forward to permit the introduction of the finger, and the tissue still remaining between the tip of the finger and the groove is cleared away. When the groove of the staff is felt a probe-pointed gorget is slid along it, the staff removed, and a drainage tube passed along the groove of the gorget into the bladder. The gorget is removed, leaving the tube in place, which drains the bladder and may be retained for a week or ten days. After the second day the



FIG. 63.—Otis's dilating urethrotome (Tiemann).

tube should be removed and cleaned daily, and the bladder irrigated to prevent infection.

In operations for internal urethrotomy the following points should be remembered: All incisions, except those at or near the meatus, should be made upon the roof of the urethra, as there is less tendency to infiltration; the operation should, when possible, be completed with one cut. The stricture should be cut at least three sizes (French) larger than the normal meatus.

What is the after-treatment of internal urethrotomy?

If hemorrhage does not yield to pressure by the fingers the penis should be bandaged tightly and evenly over a silver catheter pushed just below the posterior border of the cut stricture. Hemorrhage, as a rule, is not troublesome.

It is important that the caliber of the urethra that was obtained by the cutting operation be maintained. This is accomplished by the passage of sounds at intervals of two days. If this is neglected the wound may close and the stricture be re-established. The sound should be passed only a short distance beyond the posterior edge of the cut stricture—that is to say, not into the posterior urethra.

Hemorrhage will follow each passage for a time, but it will not be alarming. When there is no longer evidence of a disposition of the cut portion to contract, frequent sounding should be discontinued.

Describe external urethrotomy.

The patient is placed in the attitude for lithotomy. The site of the stricture being determined, the urethra is filled with sweet oil and a filiform passed through the stricture into the bladder. A tunnelled staff is then threaded over the filiform and passed into the bladder. An assistant holds the staff in the median line so as to make the perineum bulge, to give a firm field for operation. An incision is made through the skin and superficial fascia precisely in the median line of the perineum, extending from the base of the scrotum to within $\frac{1}{2}$ inch of the anus. The dissection is continued until the urethra is exposed on the groove of the staff. The canal is then opened on the groove of the staff and a silk thread passed through each edge of the wound with which to hold it open. A blunt-pointed bistoury is then passed along the groove of the guide, dividing the stricture and at least $\frac{1}{2}$ inch of tissue below it. A sound is then passed to determine if there are any constrictions which should be cut.

If the grooved staff cannot be passed through the stricture it is pushed down to its anterior margin, and the urethra opened upon it, and when the tip of the staff is laid bare the staff is withdrawn slightly to expose the filiform, which is

then used as a guide for the introduction of a grooved director. A free incision should then be made with a blunt bistoury along the director. A finger is then passed along the director into the bladder. Infiltrated patches in the urethra should be incised. If there is contracture of the bladder neck effort should be made to break it up with the finger. It is sometimes necessary to enlarge the neck by incision or by the galvanocautery. The bladder should be cleared of clots by flushing it with warm boracic-acid solution. A large perineal rubber tube is introduced with its eye just within the bladder and held there by X-way tapes. Opiates should be used if pain follows the operation.

Describe perineal section.

This operation when done without a guide is often quite difficult. The patient is anesthetized, placed in the lithotomy position, and a hooked staff (Wheelhouse) is passed down to the stricture. The staff must be firmly held by an assistant in such a way that the relations of the tissues are not distorted by pressure in any direction. An incision is made in the perineum sufficiently high to expose the normal urethra at least $\frac{1}{2}$ inch above the tip of the staff. This superficial incision is continued down to a little above the anterior edge of the sphincter, and the perineum is divided until the urethra is reached. The urethra is then divided on the groove of the staff $\frac{1}{2}$ inch above the anterior face of the stricture, and its sides are transfixed with a threaded needle. These threads, used as retractors, bring the field of operation well into position and help to identify the urethra itself, which might otherwise be hopelessly lost. The staff is now partly withdrawn and the hook turned outward so as to engage in the upper angle of the incision, permitting the operator to look directly down upon the anterior surface of the stricture. The only guide to the opening in the stricture is the *roof* of the urethra, therefore the roof must be kept intact until the stricture is cut. While keeping the field clean by gentle swabbing, careful search is made for the urethral opening, beginning between the two threads which mark the lateral

walls of the urethra and following its roof until the cicatricial structure is reached. After the opening has been found a grooved director is passed into the bladder and the knife passed along it, incising the stricture. Constricting bands are cut. A probe gorget is then passed into the bladder through the perineal opening. All instruments, except the gorget, are now withdrawn and a silver catheter is passed from the meatus along the groove of the gorget into the bladder. When certain that the catheter is in the bladder, the gorget should be removed. The silver catheter should be tied in for three days and subsequently be passed, daily, until the perineal wound has healed by granulation. A sound as large as the meatus will admit should be passed every fourth day for a month and then at longer intervals until there is no evidence of a tendency of the canal to contract.

What may be done if the opening in the stricture is not found during perineal section ?

The choice is between three procedures :

1. Cut directly back through the cicatricial tissue until the urethra is opened. This will probably cost the loss of considerable urethra.

2. Pass a finger into the rectum and locate the membranous urethra between the anus and prostate. Having identified this portion of the canal, make an incision from the last recognizable part of the urethral roof downward until the membranous urethra is opened.

3. Suprapubic cystotomy and retrograde catheterization. After the bladder has been opened a sound is passed from it through the urethra until the stricture is met. Upon the point of the sound, the urethra is readily opened, thus cutting the stricture. The after-treatment is important. A perineal tube is introduced for drainage. The bladder should be flushed with boracic-acid solution daily by way of the tube, or if cystitis is present with a 1 : 8000 silver nitrate solution. When, on the fourth day, the tube is removed a full-sized sound should be introduced and a few drops of 1 : 5000 nitrate of silver solution injected into the urethra. This is repeated every five days until the wound is healed. When

the swelling subsides the urine will traverse the natural channel instead of passing by the wound in the perineum.

What accidents may follow perineal section ?

Hemorrhage, spasm, and infection.

What is the treatment of hemorrhage following perineal section ?

Blood usually blocks the tube and fills the bladder with clots, which may cause spasm. Irrigation removes the clots. In rare cases in which hemorrhage is excessive and continuous, the wound should be packed.

What is the treatment of spasm of the bladder following perineal section ?

Spasm is caused by distention of the bladder by clots or from the irritation due to the pressure of the tube. Irrigation will relieve the spasm if due to clots; if due to the presence of the tube, opium should be given until the bladder becomes tolerant. Catheterization may be substituted for the tube if necessary.

What is the treatment of infection following perineal section ?

Diluents must be given freely. Urotropin in 5- to 10-grain doses, three times a day, is indicated to render the urine aseptic. The wound must be kept surgically clean, freely drained, and the bladder irrigated daily with a boracic-acid solution. The general strength should be increased by judicious stimulation, and properly cooked concentrated food given at regular intervals.

What strictures require special treatment ?

Irritable, resilient, and traumatic strictures, situated at the bulbo-membranous junction should be treated by external urethrotomy.

Strictures of large caliber near the bulbo-membranous junction are to be treated by gradual dilatation. When

situated in the pendulous region they should be treated by gradual dilatation. When old, fibrous, and non-dilatable, by internal urethrotomy.

Strictures at the meatus and in the neighborhood of the fossa navicularis should be divided along the floor of the urethra with a straight blunt-pointed bistoury, under cocain anesthesia.

Strictures of small caliber in advance of the bulbo-membranous junction, unless seen early and found soft, should be treated by internal urethrotomy with a dilating urethrotome.

Strictures of small caliber, situated at the bulbo-membranous junction should be treated by gradual dilatation.

Impassable strictures should be treated by perineal section.

What is urinary fever ?

Urinary fever (urethral fever or catheter fever) is an acute or chronic febrile movement preceded by a chill, and is caused by trauma to some part of the genito-urinary tract.

A chill occurs after instrumentation of the urethra or bladder (sounding, dilatation, urethrotomy, or cystoscopy), and a rise of temperature follows, accompanied by a diminution or suppression of urine.

The fever disappears in a profuse perspiration and the kidneys begin to secrete freely a urine which contains abundant urates and sometimes albumin.

The chronic form of urinary fever is a toxemia from the absorption of the vital products of pathogenic germs, especially the bacillus coli communis, through a solution of continuity in the mucous membrane of the urinary tract, and usually chargeable to a dirty instrument. Less frequently the source of the poisoning is pyogenic micro-organisms from a cystitis or pyelitis. It may also occur from the pus from an ulcer behind a stricture coming in contact with an abrasion made during instrumentation. It may begin with a chill and sharp fever, but it most often develops slowly, the first symptoms often being malaise and intestinal disturbances. The graver symptoms are those of cystitis or pyelitis, which increase the toxemia. The disease is often a serious one, especially in the aged.

What is the prophylactic treatment of urinary fever ?

Perfect asepsis of instruments, urine, and the genito-urinary tract, and great care in manipulation of the urethra in patients having diseased kidneys or bladder.

The urine should be rendered aseptic by the use of such drugs as urotropin, salol, and boracic acid.

The genito-urinary tract should be prepared by injections with boracic-acid solutions.

What is the active treatment of urinary fever ?

In acute cases the patient should be put to bed and given hot drinks, phenacetin, a saline cathartic, and, when the chill is severe, morphin. In chronic cases the treatment is addressed to the cause. For cystitis the bladder must have free drainage and irrigations. If the kidneys are not active, milk diet and large quantities of pure water should be given. Salol and urotropin are indicated. If the patient is aged, tonic doses of quinin should be administered for a long period.

What is gonorrheal rheumatism ?

An inflammation of the synovial membrane of the joints, the result of gonococci or their toxins in the blood.

Gonorrheal rheumatism has no etiologic kinship to ordinary rheumatism. It is seen in about 4 per cent. of all cases of specific urethritis. It is rare in women.

If the exudation in the joint be serous or serofibrinous in character the gonococci alone are found, but if seropurulent, pyogenic microbes also are present. The frequency of attacks in the joints is in this order : knee, ankle, wrist, finger, elbow, shoulder, hip, jaw, metatarsal, sacro-iliac, sternoclavicular, chondrocostal, intervertebral, cryco-arytenoid. In about two-thirds of the cases more than one joint is involved. Nervous and fibrous tissues and mucous membranes are sometimes affected.

What are the forms of gonorrheal rheumatism ?

Acute mono-articular, also called gonocoele; acute poly-articular and unusual forms.

What are the symptoms of acute mono-articular gonorrheal rheumatism?

It may begin with a chill, followed by slight fever, or with pain and impaired movement of a joint. Effusion into the joint is soon apparent. Rarely there is high fever with delirium, indicating a serious degree of septicemia. The symptoms are mild in cases of serous effusion, severe where effusion is serofibrinous, and most severe where it is seropurulent or purulent.

The knee is most frequently affected. As the hydroarthrosis increases the patella floats upon the effusion and rebounds suddenly if depressed and then released. The chief evidences of inflammation are now apparent—heat, redness, and swelling. Pain, which is likely to be worse at night, is dull and continuous, or throbbing and stabbing. The mono-articular form may remain subacute, the patient experiencing only slight immobility and tenderness of the joint. This condition is liable to become chronic and result in changes in the synovial membrane and articular surfaces of the bones with possible deformity.

What are the symptoms of acute polyarticular gonorrheal rheumatism?

It begins as does the mono-articular variety, a single joint being first affected. Then as each new joint is involved there is an exacerbation of fever. The severity and duration of this form are in direct proportion to the pus formation. Any form of this disease may result in ankylosis of the joint.

Describe the unusual forms of gonorrheal rheumatism.

Gonorrheal inflammation of the bursæ of the heel—the one beneath the os calcis or the one in front of the tendo Achillis—is not uncommon. Inflammation of tendinous sheaths most frequently affects the extensor tendons of the hand, the dorsal flexors of the toes, and the flexor pollicis.

The fascia in the palmar and the plantar regions may be attacked.

The muscles, especially those of the neck, may also be

affected. Gonorrheal rheumatism of the eye is important but rare.

Deaths from gonorrheal endocarditis and myocarditis have been reported.

How may the diagnosis of gonorrheal rheumatism be made ?

From the history or presence of gonorrhea ; the absence of sweating, which is so constant in ordinary rheumatism ; lack of diffused redness about the inflamed joint, and little constitutional disturbance.

What is the treatment of gonorrheal rheumatism ?

The patient should be put to bed if the joint involved is used in locomotion ; his diet regulated, and elimination, especially through the intestines, promoted. Dover's powder should be given for pain, and large doses of iodide of potassium to lessen inflammatory deposits.

The general health should be maintained by tonics and appropriate food. Methylene-blue in 4-grain doses (in capsule form) may be given three times a day for its antiseptic effect.

Local treatment alone can control the fountain of poison which supplies the cause of the disease. Treatment for the cure of the inflamed urethra must be vigorous.

During the acute stage the joint should be immobilized ; at the same time, hot fomentations, such as lead and opium, should be applied.

After the acute stage has subsided counterirritation with compound tincture of iodine and the like is valuable.

Chronic effusion into the joint may be treated by the Paquelin cautery. Ichthyol, blisters, pressure, massage, and hot and cold applications likewise hasten the disappearance of the hydro-arthritis.

When suppuration has destroyed the synovial membrane of the joint resection may be desirable.

What is rheumatic gonorrheal ophthalmia ?

An unfortunate expression, as it is inaccurate and confusing. The term gonorrheal ophthalmia has so long been applied to gonorrheal conjunctivitis that its use suggests this

malady, and the affections of the deeper tissues of the eye may occur without the existence of an arthritis. What is meant is a metastatic gonococcic iritis, choroiditis, or both (irido-choroiditis or uveitis). These conditions do not cause a gonorrheal conjunctivitis, neither are they caused by it, except through a general destructive inflammation following perforation of the cornea, in which cases they are simply a part of the resulting panophthalmitis.

Cases of inflammation of Tenon's capsule and the tendinous muscular attachments of the eye have been observed in subjects who have at some time had a gonorrheal arthritis, but the dependence of the ocular condition upon gonococci infection has not been clearly demonstrated as a pathologic entity.

What are the symptoms of metastatic gonorrheal irido-choroiditis?

Involvement of the choroid probably always results in a suppurative process. Pain and rapid impairment of vision to the point of blindness are the most urgent symptoms.

A pinkish blush is at first noticed beneath the conjunctiva, with maximum intensity at the corneal limbus, which increases to a deep red, the conjunctiva becoming intensely chemosed so as to protrude between the lids.

If seen early ophthalmoscopic examination may show a characteristic focus of inflammation in the choroid, but usually when seen first there is a yellow reflex from the pupil and the fundus is invisible.

As the ciliary body and iris become involved the pain becomes more intense, the aqueous turbid and later purulent, the iris adherent, possibly slightly dilated, and the cornea cloudy.

As the tissues break down perforation occurs, pain subsides, and healing by granulation takes place, resulting in a shrunken eye, at times with calcareous deposits in the choroid elements in later years.

Tension is at first apt to be increased; later, as the tissue breaks down, it becomes diminished.

Meningitis may ensue from the purulent panophthalmitis.

When the iris is primarily involved the course is not

necessarily so violent. Pain is marked, with increasing pericorneal injection; adhesions of the iris to the anterior capsule of the lens occur, resulting in fixation of the pupil, and irregularity or rigidity when later dilated under atropin.

A cloudy deposit usually occurs on Descemet's membrane, and frequently the exudate in the anterior chamber becomes purulent, resulting in hypopyon. Vision is early and progressively impaired, depending at first upon disturbances of accommodation, and later upon the extent of exudate. If the inflammation is more than moderately severe the conjunctiva becomes chemosed and more or less mucopurulent secretion occurs; this, however, seldom if ever contains gonococci.

The increased tension of the globe from intra-ocular extravasation may develop a true secondary glaucoma.

When not brought under control panophthalmitis develops by extension to the rest of the uveal tract.

What is the treatment of metastatic gonorrheal iritis?

When the iris is primarily involved, atropin (0.5 per cent. to 5 per cent.—with great circumspection in the stronger solutions) is to be used from three to six times in twenty-four hours until, if possible, complete mydriasis is produced, which should be persistently maintained; hot fomentations (not poultices) should be applied for five or ten minutes every hour, or, as comfort may demand, for a longer period at longer intervals; if there is any conjunctival secretion the surface should be flushed with a 2 to 3 per cent. boracic acid solution sufficiently often to maintain cleanliness; if the inflammation becomes intense and the iris does not respond to atropin, from 2 to 3 ounces of blood may be extracted from the temple by means (preferably) of wet cupping; if pus forms in the anterior chamber it should not be evacuated unless the accumulation increases for upward of twenty-four hours, when free incision should be made across the cornea half-way (preferably) between the center and lower border, and the anterior chamber carefully flushed with 1:5000 mercuric cyanide solution.

Opiates or other sedatives must be given frequently enough to maintain a degree of comfort compatible with the severity of the malady. Salicylates in large doses, 20 grains, every

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two to four hours (if tolerated) undoubtedly exercise a beneficial influence in connection with supportive regimen, and a most active campaign must be carried on against the original cause.

What is the treatment of metastatic gonorrheal choroiditis?

Involvement of the choroid usually signalizes a panophthalmitis resulting in loss of sight and a more or less shrunken eye. Undoubtedly some of these cases are mild enough to undergo resolution without rupture of the globe, and may remain quiescent indefinitely. Atropin, hot fomentations, and anodynes may carry such cases over to this condition.

When the process is violent, the chemosis great, and a well-marked yellow reflex is seen in the pupil, the condition should be treated as an abscess on general surgical principles—a free crucial incision being made through the cornea, the entire contents of the globe removed with a sharp curette (under general anesthesia), and the cavity cleansed and gently packed with gauze, the dressing being changed daily until cicatrization is complete.

It is usually best to avoid enucleation in the active stage of the inflammation. Later it is a question if these phthisical stumps should not be removed, on account of the danger of sympathetic involvement of the fellow eye. It is perhaps not best to do this in cases who are able to remain more or less under surveillance, but among the laboring classes it is unquestionably best to rid the patient of a source of future trouble.

What is gonorrheal conjunctivitis?

Gonorrheal ophthalmia; blennorrhea ophthalmica; in the first few days of life it is generally designated as ophthalmia neonatorum; an acute purulent inflammation of the conjunctiva due to inoculation with gonococci.

What are the symptoms of gonorrheal conjunctivitis?

Irritation of the lids with rapidly increasing congestion and hypersecretion of the ocular and palpebral conjunctiva, the latter assuming a purulent character within twenty-four to thirty-six hours, when chemosis develops, the lids becoming

swollen, red, and somewhat indurated. Photophobia is marked and compression of the lids results in retention of considerable secretion, which produces a tendency to maceration of the cornea, in which cases ulceration is probable, with perforation, prolapse of iris, and panophthalmitis.

During the first twenty-four hours a microscopic examination may be necessary to differentiate from acute epidemic conjunctivitis. An acute conjunctivitis should be assumed to be gonorrheal whenever it occurs in an individual having a gonorrheal inflammation elsewhere.

What is the treatment of gonorrheal conjunctivitis ?

Prophylactic and remedial.

Prophylactic: Any individual with an acute or chronic gonorrhea should be emphatically warned of the danger of contamination, not only as to himself, but others. Infection can be prevented almost certainly if immediately after contamination (known or supposed) the conjunctiva is thoroughly flushed with a sterile warm salt (0.6 per cent.) or boracic acid (2 per cent.) solution, to be followed by an application or instillation of 20 per cent. argyrol or 1 per cent. silver nitrate solution, the flushing to be repeated at intervals of three hours during the first day and three times on the second day. A 10 per cent. solution of argyrol may be used once or twice more on the first day and twice on the second. The silver nitrate should not be repeated until the second day. It has the greatest disadvantage over argyrol of being less germicidal in tolerable concentration, and of being so irritating as to be capable of setting up a catarrhal inflammation of its own and requiring much more skilful and judicious management. Gonorrheal conjunctivitis in the newborn is responsible for about 25 per cent. of all cases of blindness, and yet it is almost as preventable as and much more curable than the same disease in older persons. Aside from the care and surgical cleanliness in connection with the parturient mother the physician who neglects to take the simple and effective precautions against this disease in connection with the infant assumes a grave responsibility.

The eyelids of the baby should be carefully cleansed with

sterile cotton soaked in sterile boracic acid or normal salt solution before it is bathed, and a 20 per cent. solution of argyrol can be used with impunity. Experience seems to have demonstrated that this is quite as efficacious as Crede's method of employing a 2 per cent. silver nitrate solution, which was open to the objection that it usually set up a mild catarrhal conjunctivitis.

If either the mother or father is known to have an active gonorrhea the cleansing and argyrol (10 per cent.) should be continued three times a day for two days, and once a day for three days more. The disease usually develops on the third or fourth day.

Remedial: The disease having become established, rigid cleanliness is the most important feature of the treatment, and it matters comparatively little what solution is used for the purpose so that it be not irritating—boric acid, 2 per cent.; sodium chloride, 0.6 per cent.; mercuric chloride, 1:10,000 or 1:5000; mercuric cyanide, 1:5000; potassium permanganate, 1:2000, or weak iodine or chlorin water—the cleansing to be sufficiently constant to *maintain the surface free from pus*.

Except in very debilitated subjects, or when the nutrition of the cornea shows signs of impairment by a dull gray central cloudiness (in which case hot fomentations are indicated, five minutes every two hours), iced compresses should be applied constantly for forty-eight hours, after which an intermission of an hour once in six hours is advisable; a 30 per cent. solution of argyrol should be instilled, or, if possible without touching the cornea, brushed with a cotton applicator into the palpebral conjunctiva for the first day, allowing it to remain without washing off, three times a day and once a day thereafter, supplementing it by a 10 per cent. solution twice a day. In all but the mildest cases just a sufficient amount of atropin should be used to maintain mydriasis, unless the corneal tissue becomes invaded, when it should be pushed more actively, or in some cases where peripheral perforation is threatened, eserine (0.2 to 0.5 per cent. solution) is to be substituted guardedly. Immediately upon the occurrence of the slightest erosion or ulceration of the corneal surface the eye should be cocainized and pure tincture of iodine

applied with care that it does not run over the rest of the surface. This may be repeated two or three times a day. As a final resort, if the ulcer shows no indication of yielding, the galvanocautery should be employed under general anesthesia.

When induration and compression of the lids are extreme a free canthotomy should be done; it relieves tension and heals quickly, but should be carefully dressed with some protective powder (xeroform, dermatol, etc.).

Sterile cold cream (*unguentum aquæ rosæ*) on the edges of the lids facilitates exit of secretion and helps to prevent excoriation, but should not be used unless necessary, as it interferes with delicacy and accuracy of manipulation, the most important feature of the treatment next to cleanliness. Anodynes and supportive treatment may be indicated in some cases. The room should not be darkened nor brightly lighted, but the patient should not face what direct light there is. Constipation is to be avoided, but none of the infectious material is removed by purgation. The value of a microscopic examination for differential diagnosis should be kept in mind, as proper treatment bears a close relation to the nature of infection.

What are the general symptoms of gonorrhea in the female?

The evidence of the microscope aside, they correspond early to simple inflammation of the mucous membranes. The discharge is at first transparent and mucus, then mucopurulent, and finally purulent.

When derived from the vagina, it is acid, creamy, and readily removed from the surface; when from the cavity of the cervix, unmixed with vaginal secretion, it is alkaline, nearly transparent and tenacious, like the white of an egg.

Describe gonorrheal urethritis in women.

When the urethra is the seat of the infection a drop or more of pus can be milked from it by the examining finger; the meatus will be seen pouting, and complaint is made of ardor urinae and frequent urination. Bladder involvement occurs, if at all, early, much sooner than in the male, owing to the

shortness of the urinary canal. The inflammation is like that of the male urethra.

What is the treatment of gonorrheal urethritis in the female?

Neutralization of the urine, as advised in gonorrhea in the male, and painstaking cleanliness. High injections by means of the irrigation method and the several urethral injections can be given in the female as readily as in the male, indications for their use being practically the same.

What may complicate urethritis in the female?

Inflammation of Skene's glands, the peri-urethral glands, para-urethral glands, the bladder, ureters, the pelvis of the kidney, and finally the kidney substance.

Describe inflammation of Skene's glands.

Inflammation of these glands, which open behind the urethral orifice, is likely to be overlooked, unless it is so active that the meatus becomes everted so as to show the openings of the ducts, which look like little ulcers, each seated on a deep red papule. If the swelling is sufficient to evert them, there is great pain during urination, sitting, or attempts at coitus.

Treatment consists of slitting, cleaning, cauterizing with carbolic acid, and packing the cavity until it heals by granulation from the bottom.

Describe inflammation of the peri-urethral glands.

These small glands, which are located in the anterior half inch of the urethra, appear, when inflamed, as pinhead elevations, perhaps half a dozen in number. They should be opened and cleansed. Healing from the bottom should be encouraged by antiseptic applications.

Describe inflammation of the para-urethral glands.

These follicles, which are located in the vestibule, appear, when inflamed, as red papilli, which yield a thin pus under pressure. The possibility of fistulæ being formed from abscess of these glands gives them importance.

They should be slit freely and the incision packed to force healing from the bottom.

May the urinary tract become involved from the gonorrheal process in the female genital tract?

Yes; but it is a rare complication. (See Cystitis and Pyelitis in the Male.)

May the os uteri be the seat of gonorrheal infection?

Yes; but as compared with gonorrheal urethritis in the female it is infrequent. Its importance depends principally upon the liability of the inflammation through continuity of mucous surface to involve the uterus and tubes.

What are the symptoms of gonorrhea of the os uteri?

In the majority of cases subjective symptoms are slight and the surface of the os is red and swollen and exhibits a mucopurulent secretion. In the severe cases there is complaint of radiating pains over the abdomen, lumbar region, and thighs. Fever is frequently present. Erosions may be seen around the os, or a ring of acutely red mucous membrane pimples over with enlarged muciferous glands may be present.

What is the treatment of gonorrhea of the os uteri?

If the vagina is not involved the cervix should be exposed by speculum, and the os and vagina well cleansed with a mild antiseptic solution.

The os should be gently stretched by a dilator and the secretion removed. Compound tincture of iodine, nitrate of silver stick, or pure carbolic acid may be used in the uterine neck. A tampon moistened with glycerite of tannin is then applied and left over night. The tampon should be renewed every day, and carbolic acid or silver applications made every fourth day, and recovery finally induced by antiseptic applications. These measures rarely cure a gonorrheal infection of the os. Even curetting often fails and hysterectomy may end the treatment.

What are the symptoms of gonorrheal endometritis?

In the case of average severity there may be fever, nausea, and vomiting, and a sensation of heat and bearing-down pain in the pelvis which radiates to the back. The uterus is

swollen and acutely tender. There is a free leucorrhea, which is more or less purulent and often tinged with blood.

What is the treatment of gonorrheal endometritis ?

Gonorrheal endometritis, or gonorrhea of the os uteri, emphatically classifies the sufferer as a "hospital patient," as the disease here located demands the most skilful management. The os must be dilated and then the mucous membrane must either be curetted, or to it must be applied quite strong caustic solutions (chloride of zinc, Lugol's solution, etc.). Cure of this disease, short of surgical intervention, often fails.

What is gonorrheal vulvitis ?

The involvement of the mucous membrane of the vulva, usually from contact with the secretion from the parts above. It may occur primarily.

What are the symptoms of gonorrheal vulvitis ?

Burning and itching at the vulva are first noticed. Upon examination the external genitals are seen to be swollen, red, and moist. The amount of secretion increases and is soon purulent, foul-smelling, and tinged yellow or green. The vaginal entrance is closed, and the mucous membrane shows excoriated spots. Urination is difficult because of the tumefaction at the meatus, and contact of the urine with the eroded spots is painful in the extreme.

The anus may become involved by the secretion flowing backward over the perineum. Such a condition should be avoided by cleanliness. Sexual desire may be increased, but gratification is barred. Vulvitis is the most severe form of gonorrhea. In young girls it is usually gonorrheal.

What is the treatment of gonorrheal vulvitis ?

To remove mucus and sebum use water containing soda. The parts should be cleansed three times a day with a solution of boracic acid, 2 drams to the pint. The lotion is warmed and dropped from a sponge on to the labia. The lips should then be dried by a soft absorbent cloth laid against them, but not rubbed. A thin compress of sterile gauze impregnated with pulverized acetanilid or stearate of zinc is then placed between the mucous surfaces to prevent friction.

In severe cases the patient must lie with hips elevated and be given hot hip-baths every four hours.

Hot applications of lead and opium solution may be used. When the swelling subsides, if excoriations remain they should be touched with a 20 grain to the ounce solution of nitrate of silver, followed by a drying powder on a gauze dressing.

What are the complications of gonorrheal vulvitis?

Bubo, vulvovaginal abscess, and vegetations. (See Bubo in the Male.)

What is vulvovaginal abscess?

Suppuration in a gland of Bartholin. These glands are situated upon either side of the vaginal entrance. If the gland is not entirely destroyed in the first attack the suppuration is likely to recur. Gonorrheal abscess of one of these glands may occur without a vaginitis, and inflammation may occur in the duct without involvement of the gland. Gonococci are often found in this situation months after a clap is cured and may reinfect the vagina.

What are the symptoms of vulvovaginal abscess?

There is heat, swelling, redness, and tenderness over the seat of the affected gland and a pyriform swelling beside the vaginal inlet. This condition may be confused with hernia, but a careful manipulation soon shows that the canal is not involved. The tumid gland can be outlined between the thumb externally and a finger in the vagina. A drop of pus can usually be forced out of the mouth of the duct, and in chronic cases perhaps a teaspoonful or more may be expressed.

What is the treatment of vulvovaginal abscess?

If seen early, cold applications, such as a condom filled with ice, should be used in hope of aborting the abscess. If the swelling increases during twenty-four hours of such applications, change should be made to hot poultices to hasten supuration. When fluctuation is evident make an incision through the mucous membrane at the dependent point. This incision must be free enough to allow packing of the cavity, as recovery depends upon healing from the bottom.

What is gonorrheal vaginitis?

Inflammation of the vagina due to gonococci. A primary gonorrheal affection of the vagina is rare as compared with gonorrhea of the urethra or os uteri, but it is secondarily infected.

What are the symptoms of gonorrheal vaginitis?

The vaginal mucous membrane becomes hot, dry, red, tumid, and tender. During the second day there appears a discharge which is at first mucus, but rapidly becomes purulent and offensive and may be streaked with blood. Urination becomes frequent, there is dull pain in the hypogastrium, and discomfort in the rectum. The discharge corrodes the epithelium about the vulva.

What is the treatment of gonorrheal vaginitis?

Rest in bed, low diet, cathartics, and sitz baths. The danger of upward extension should always be borne in mind. Scrupulous cleanliness is essential. Copious irrigations with hot water should be given as soon as the parts will allow manipulation.

After the acute symptoms have subsided, douche night and morning with one of the following astringents: acetate of lead, sulphate of zinc or alum, 1 teaspoonful to the pint of water; acetate of zinc or tannic acid, 2 teaspoonfuls to the pint of water.

As early as the patient will bear it a speculum should be introduced, denuded spots touched with a 10 per cent. solution of nitrate of silver, and the vagina gently packed with gauze previously rolled in glycerite of tannin. If ulcerations persist the spots should be touched with carbolic acid and the vagina tamponed with gauze impregnated with iodoform or with simple gauze.

If the vagina is too sensitive to bear such a tampon, use one of the following suppositories:

R	Ext. opii,	gr. iij;
	Acid. tannic.,	gr. xij;
	Ol. theobrom.,	q. s.
M.	ft. sup. No. xii.	
Sig.	—Insert one at bedtime.	

R Pulv. aluminis,
Cerat. plumbi subacetat., ʒiij.
M. ft. sup. No. xii.
Sig.—Insert one at bedtime.

Describe vegetations occurring in connection with gonorrhea in the female.

Vegetations or warty growths located about the genitals of the female are highly irritating and occur as the result of a secretion—usually gonorrheal—flowing from the vagina and coming in contact with the vulva, thighs, or perineum. They are frequently found about the fourchet and the margin of the anus, and are very common in women suffering from chronic gonorrhea. They may be of any shape or size, dry or moist. They may disappear in a week or so, leaving no scar.

What is the treatment of vegetations occurring in connection with gonorrhea in the female ?

If small they can be snipped off with scissors and the stump touched with fuming nitric acid, followed with a dry dressing. If large the parts must be cocaineized and the growth shaved level with the surrounding surface, touched with pure carbolic acid, and dressed dry.

What forms of inflammation occur upon the genitals of girl babies ?

Catarrhal vulvitis, which usually depends upon seat-worms, but may be produced by irritating urine, feces, filth, or discharges incident to the exanthemata. This inflammation is usually confined to the vulva.

What are the symptoms of catarrhal vulvitis in the girl baby ?

Heat, swelling, redness, pain, and itching ; there may be ulcerations or excoriations which are extremely painful.

What is the treatment of catarrhal vulvitis in the girl baby ?

• Seat-worms, if present, should be removed. The parts should be frequently cleansed by dropping boracic-acid solu-

tion upon them. Astringent dusting-powders, such as bismuth and oxide of zinc, should be used after drying the parts. The inflamed area must be kept surgically clean and the lips separated by the interposition of surgeon's gauze.

What are the symptoms of gonorrheal vulvovaginitis in the child?

Great swelling and intense hyperemia of the mucous membrane of the vagina and vulva, which bleeds when touched. There is soon a free discharge of pus, which may be blood-stained, and there are pronounced ardor urinæ and high fever. The disease always begins sharply and is attended with severe suffering.

What is the treatment of vulvovaginitis in the child?

First, the eyes should be guarded against infection. Milk diet, laxatives, and hot baths should be prescribed. Three or four times daily a sterilized, soft-rubber catheter should be inserted into the cavity of the vagina, and there should be gently injected a 1:10,000 hot solution of bichlorid of mercury, or a 1 per cent. solution of carbolic acid, or boracic acid solution, 10 grains to the ounce of water. After irrigation the vulva should be dried with a soft absorbent gauze laid upon the parts and dusting-powders applied. The lips should be gently separated and soft gauze placed between them. When the inflammation begins to subside, an astringent may be added. If the urethra is involved, small doses of salol should be given by the mouth. (See Treatment for Gonorrhea in the Male.)

SYPHILIS.

What is syphilis ?

Syphilis may be defined as a contagious, systemic, eruptive disease acquired by inoculation or hereditary transmission.

Syphilis first appeared in the army of Charles VIII., 1494-95, after the siege of Naples.

Is syphilis a germ disease ?

The spirocheta pallida, discovered in May, 1905, by Schaudinn and Hoffman, has been found in all the lesions of early syphilis and in a few tertiary manifestations: in the blood, before the administration of mercury; in albuminous urine, and once in the glands of the apparently healthy mother of a syphilitic child. Such evidence justifies the claim that the spirocheta pallida is either the real cause of syphilis or an important phase in the life cycle of some micro-organism that is the cause.

Describe the spirocheta pallida.

Four to ten mikra in length, average length seven mikra, its breadth about 0.25 mikron. The spirals number six to fourteen, are abrupt, narrow, regular, and deep. It has pointed ends, progresses by rotation upon its long axis, and when at rest shows undulatory movements in its whole length, suggestive of the play of a vibratile membrane.

How is the presence of the spirocheta determined ?

The classic method of preparing and staining is Schaudinn and Hoffman's modification of Giemsa, as follows:

1. Obtain the specimen by scratching the surface of the lesion (chancres mucous patch); after having washed it thoroughly clean of all contamination—the admixture of a trace of blood does no harm. Spread the secretion thus obtained as thin as possible; dry without heating; harden for fifteen minutes in absolute alcohol.

2. Employing the Giemsa stain, diluted by adding about 1 drop to 1 c.c. of water (to which 1 to 10 drops of 1:1000 calcium carbonate has been previously added—this is advantageous, but not essential).

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3. Immediately spread the diluted stain on the specimen and let it stand one hour.

4. Wash freely in water, dry without heating, and mount.

The best stain for tissue specimens is Levaditi's modification of the Raymon y Cajal silver stain :

1. Sections are cut 1 mm. thick and hardened in 10 per cent. formalin for twenty-four hours.

2. Wash and harden in 96 per cent. alcohol twenty-four hours.

3. Wash a few moments in water until they sink.

4. Impregnate with silver by soaking for three (to five) days in a 1.5 (to 3) per cent. solution of silver nitrate at a temperature of 38° C.

5. Wash rapidly in water and place for twenty-four (to forty-eight) hours at the room temperature in the following :

Acid pyrogallic,	2 gm. ;
Formalin,	5 c.c. ;
Aq. destill.,	100 c.c.

6. Wash, dehydrate in absolute alcohol, and mount in paraffin.

7. Cut sections no thicker than 5 μ .

8. Stain either with (a) Giemsa, for a few minutes ; wash in water, differentiate in alcohol containing a few drops of oil of cloves, clarify in xylol, and mount in balsam ; or (b) concentrated toluidin-blue solution, differentiate in alcohol containing a few drops of Unna's ether-glycerin mixture, xylol, balsam.

How is syphilis communicated ?

The virus of syphilis must enter the circulation through a solution of continuity. Examples : a friction sore, a tear, a scratch, or an excoriation from confined smegma. The virus may enter through an herpetic eruption or through moist warts. Balanitis, urethritis, and concealed chancroid may obscure the implanted chancre.

What are the sources of syphilitic contagion ?

The chancre is responsible for the largest number of infections, and after it they occur, as to frequency, in this order :

the secretions from the secondary lesions—mucous patches, condylomata—the blood and lymph. The tears and milk, saliva, sweat, and urine are innocuous, if not contaminated by admixture of blood or secretions from secondary lesions. The semen is innocuous, except that it transmits syphilis to the ovum it impregnates, and the mother may acquire it through the placental circulation.

What are the modes of contagion ?

Direct and mediate. In direct contagion the disease is communicated during the sexual act or the result of unnatural methods of passionate embrace. Syphilis may also be contracted directly, independent of the sexual act, by kissing, biting, breast drawing, and during examinations. A nursing infant may contract chancre from the nipple of a syphilitic nurse, or the nurse may be infected from a mucous patch in the mouth of a syphilitic baby.

In mediate contagion the virus is communicated through some object other than a person, as in the mutual use of household utensils, or through nursing-bottles, diapers, bed-clothing, towels, etc.

What is syphilis insontium ?

Syphilis acquired innocently, by mediate infection, therefore not of venereal origin, a fact to be demonstrated in medico-legal cases.

How many forms of syphilis are there ?

Two, acquired and hereditary.

What is acquired syphilis ?

Syphilis communicated by direct or mediate contact.

What is the prognosis of syphilis ?

An accurate time limit for the cure of syphilis cannot be determined clinically ; it is known that some patients fail to show symptoms of syphilis after six or eight months' treatment, marry within a year or two, and beget healthy children ; while others (fortunately in the minority) bear the stigma of the disease, in spite of the most painstaking and

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scientific treatment, until their life is ended in a struggle with one of the parasymphilides.

May syphilis be acquired more than once ?

One attack practically confers immunity for life.

What are the stages of syphilis ?

For clinical description syphilis is divided into four stages : the primary, secondary, tertiary, and the stage of the parasymphilides.

What is the period of primary incubation ?

The primary incubation period covers the time from the entrance of the infecting virus to the evolution of the chancre.

There are no symptoms characteristic of the primary incubation. The average duration of this period is twenty-one days ; the shortest period, ten days ; the longest, ninety.

Describe the period of secondary incubation.

The secondary incubation period is the time which elapses between the appearance of the chancre and the eruption. This period has an average duration of forty days. The shortest period is fourteen days ; the longest, five months.

How much time may elapse between inoculation and chancre and eruption ?

In the average case chancre occurs twenty-one days after successful inoculation, and the eruption forty days after the chancre. However, as the shortest period admitted for the primary incubation is ten days, and for that of the secondary incubation fourteen days, the eruption may appear as early as the twenty-fourth day from inoculation. On the other hand, remembering that the longest period admitted for the primary incubation is ninety days, and that for the secondary incubation five months, the eruption may not appear until eight months after inoculation. It must be remembered that these estimates illustrate the extreme limits.

What is the primary stage ?

The time between the appearance of the chancre and the first general eruption, which indicates that the blood is satu-

rated with the virus. The average duration is forty days. It may be as short as fourteen days or as long as five months.

What are the symptoms of the primary stage ?

The initial lesion and the enlargement of the lymphatic glands immediately connected with the point of inoculation. Toward the close of this period the glands remotely situated from the local sore become involved, and there is pain, especially at night, in the long bones, periosteum, cranium, joints, and muscles. These symptoms appear before the general eruption. Such occasional prodromata as jaundice and albuminuria may also appear about this time.

What is the secondary stage ?

The secondary stage begins with the eruption and mucous patches and continues for from six months to two years, the average time being eighteen months, its duration depending upon the susceptibility of the patient and his responsiveness to treatment.

What are the important symptoms of the secondary stage ?

Eruptions of the skin and inflammations of the mucous membrane. Fever always ushers in the first eruption, but in many instances may be so slight as to be overlooked.

What is the tertiary stage ?

This stage appears after a varying period of latency, and is characterized by lesions of syphilis which are localized and destructive of tissue. They consist of relatively diffuse infiltrations, terminating in the production of masses of scar-tissue or of relative masses (gummata) tending to central caseation. They show little tendency to heal spontaneously, but spread to the surrounding tissue, advancing in a circular or circinate way and destroying tissue.

The tertiary stage under present-day treatment may never appear. When tertiary lesions appear, they are seen oftenest in the third year of the disease, but may be present as late as the fiftieth year. Tertiary lesions may, in a general way, be separated into four classes, in the following proportions: Lesions of the skin and subcutaneous tissue, lesions of the

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skin, 31 per cent. (544 cases) ; lesions of the nervous system, 31 per cent. (598 cases) ; lesions of the viscera and mucous membranes, 17 per cent. (308 cases). (Keyes.)

Lesions of the nervous system are proportionately little more and lesions of the skin little less frequent after the tenth year of the disease than before this, while the proportion of bone lesions remains about the same throughout.

What are the parasymphilides ?

Conditions which, without being pathologically syphilitic, are clinically due to that disease. Eczematous-looking nails, apparently due to syphilis, and yet persisting after the truly syphilitic lesions had been cured, is an example.

Arteriosclerosis, certain cases of epilepsy, glycosuria, etc., tabes dorsalis, paresis, Erb's spastic spinal paralysis, are all typical examples, and, lastly, defects of development imparted by hereditary and, to a less degree, by infantile syphilis, should be mentioned.

What is chancre ?

The initial lesion of syphilis, also called the infecting sore, the indurated Hunterian chancre, the primary sclerosis, the initial neoplasm, or the primary syphilitic ulcer.

It is the first outward manifestation of a successful syphilization and always appears at the point of inoculation.

How many chancres may occur at one inoculation ?

Usually but one, although there may be more, infection having occurred *simultaneously* at several points.

Where are chancres located ?

Usually upon the genitals, when they are called genital chancres. They may also occur on the lips, tongue, tonsils, and eyelids or the conjunctiva, the ear, neck, fingers, pubes, belly, breasts, arms, axilla, between the nates, within the rectum, on the scrotum, and elsewhere. These are spoken of as extra-genital chancres.

What is the significance of a single sore on the glans penis ?

If a single sore irritated by heat, friction, and moisture

from the prepuce covering and which has not received special treatment, remains discrete, chancre should be suspected.

How many forms may chancre assume ?

Six : the erosion ; the dry papule or patch ; the umbilicated papule, nodule, or follicular chancre ; the purple necrotic nodule ; the silver spot ; and the ecthymatous form.

Beginning in any one of these forms, the chancre ordinarily becomes a superficial erosion with purplish halo, sloping smooth red floor, and serous secretion. After a few days a circumscribed base of induration is added. The more frequent modifications of the six types of chancre are : ulcer elevatum ; multiple herpetiform ; parchment ; annular ; indurated nodule ; chancre with cream-green colored membrane ; and infecting balanoposthitis.

Describe the erosion.

This variety of chancre is by far the most common. It begins as a small definitely rounded excoriated spot, which looks as if the horny layer of the epithelium had been removed. So superficial is it at first that it seems level with the surface on which it occurs. Subsequently it acquires an indurated base. This form of chancre is most frequently found on the inner layer of the prepuce. The shape of this lesion is generally circular or ovoid. Its floor is but slightly, if at all, excavated. The surface is smooth, polished, deep dull-red, often coppery color, with parchment-like induration, and is usually destitute of granulations. Velvety granulations may be present, from which a serous fluid oozes upon squeezing. The lesion at times becomes saucer-shaped. This chancre is usually solitary, but there may be a dozen or more. It is then called multiple herpetiform chancre. When there is considerable cell growth beneath this lesion, it becomes elevated above the surrounding tissue and is then called the *ulcus elevatum*.

Describe dry papule or patch.

This chancre is most often found upon the glans or prepuce (when retracted) and, as a rule, is single. It is also found upon the integument of the penis, on the thighs or pubes. It

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begins as a dull-red spot, develops slowly and, as its name indicates, remains dry. A modification of this lesion is one slightly salient, not indurated, but sharply defined, feeling like wet chamois skin, under pressure.

Describe the umbilicated papule, nodule, or follicular chancre.

This variety is rare. It begins as a small pinkish umbilicated elevation, which grows and assumes the form and appearance of a molluscum sebaceum. It is firmly indurated, sharply circumscribed, and deeply concave, with a smooth surface that is deeply red.

Describe the purple necrotic nodule.

This nodule is rare. It occurs only under the foreskin, on the glans, or in the coronal sulcus. It begins as a red spot and becomes markedly convex; is firm and dense and when fully developed is a purplish papule with a glossy surface about the size of a split pea.

Describe the silver spot.

This is a very rare lesion. Its favorite location is the glans or the meatus, where it has the appearance of a spot touched with nitrate of silver. It is less than a line in diameter. It increases slowly and is finally replaced by a smooth shining surface.

Describe the ecthymatous chancre.

It is the brownish-black or greenish-brown crust-covered chancre which develops from a dry papule or from an erosion, or the *ulcus elevatum*, on a cutaneous surface, the result of local irritation with pus formation. The dirty crust forms slowly from an ulcerating base. It never begins as a pustule.

Describe *ulcus elevatum*.

This chancre, a modification of the erosion, depends upon the sharply limited area beneath the lesion becoming the seat of cell growth, which elevates it several lines above the surrounding surface.

Describe multiple herpetiform chancre.

This lesion, a variety of the erosion, is frequently mistaken for herpetic vesicles, which it closely resembles. Differentiation depends upon the following points: the chancres are small, discrete, shining, rounded excoriations of a deep-red or raw-ham hue, do not itch nor burn, and run a chronic course, accompanied by induration of the inguinal glands. After remaining several weeks in the herpetic form they may coalesce.

Herpes, which is most likely to be mistaken for this variety, has a bright-red color, a vesicular surface at first, acute inflammatory course, with heat, itching, and burning, and, usually, a history of previous attacks. Herpes subsides rapidly under astringents and protection.

Describe parchment-like chancre.

As an erosion grows older its surface rises above the surrounding integument perhaps a third of a line. It acquires an indurated disk-like base. This form is found on the integument of the penis and vulva.

Describe the annular chancre.

This name is applied to the ring-like primary lesion, the center of which is thickened and infiltrated. It is found on the internal surface of the prepuce, sometimes on the glans or upon the integument.

Describe the indurated nodule or mass.

A lesion formed by the slow accumulation of syphilitic cells from proliferation of one of the above-described forms of the initial lesion. This variety may exist as a sharply limited lump under the skin, complicated by edema. In the male it is most likely to appear in the sulcus or upon the meatus.

Describe chancre with cream- and green-colored membrane.

A condition in which the lesion develops a false membrane covering its central part, having a mixture of cream and light-green colors. This coat is not shed, but its color becomes darker.

What is infecting balanoposthitis ?

A development of the initial lesion in a diffused infiltration of the mucous layer of the prepuce and glans. It usually begins as an erosion and extends itself. The prepuce becomes thickened until more or less of its extent is involved in patches, the color remaining normal. Upon palpation a mild, not well circumscribed, resistance is felt. The lesion consists of a combination of cell infiltration and hard edema.

What is urethral chancre ?

One occurring within the urethra. The symptoms of concealed chancre are usually a discharge generally thin, often bloody, coming on long after suspicious connection ; a painful spot in the urethra, which produces chordee and a lump which can be felt. In some cases a discharge similar to gonorrhea is the only evidence. The endoscope will reveal a suspicious looking ulcer, and a characteristic hyperplasia of the inguinal glands may well create suspicion as to its nature. This form of chancre is most often located just within the meatus.

What are the characteristics of chancre of the lip ?

Labial chancre is common and may or may not be inflammatory. When it begins as a small excoriation or fissure, runs an ephemeral course without induration, and disappears in a week or ten days, it is mistaken for a cold sore. When it develops and becomes circular in outline and well raised above the surrounding tissue, it becomes inflammatory and may be mistaken for labial epithelioma.

Chancre is followed in about ten days by engorgement of the submaxillary glands. Labial epithelioma is painful, ragged, and yields an offensive discharge, is not followed within a month by enlargement of the submaxillary glands, and occurs usually on the lower lip of one past middle life.

Describe chancre within the mouth.

Chancre within the mouth has often been erroneously diagnosed because of Vincent's angina. The latter disease may involve only part of the buccal cavity, imitate chancre perfectly, and be even more rebellious to treatment. There may

be diffused inflammation or localized ulceration of the mucous membrane. The general inflammation is greater, the glands more tender, and the sore more superficial than in chancre, and the diagnosis is rarely made without a microscopic test or the appearance of the syphilitic eruption.

Describe tonsillar chancre.

In the absence of Vincent's angina, tonsillar chancre is frequently mistaken for tonsillitis. The syphilitic lesion may be so minute as to escape notice, or it may involve the entire tonsil, which then becomes uniformly enlarged, red, and glazed; only rarely can induration be detected. The diagnostic point is the early pain, difficulty in swallowing, and the huge proportions attained by the submaxillary, sublingual, and, rarely, the preauricular glands.

Describe digital chancre.

Chancre of the finger appears most frequently at the base of the nail where fissures abound. According to location, it may develop into a large, fleshy mass; a warty or papillomatous growth; a scaling papule of the skin, or remain a single incrustated excoriation. There is marked thickening and glazing of the surrounding surface, but, on account of dense infiltration, typical induration cannot be detected. Digital chancre is nearly always inflammatory, the lymphatics showing as red streaks. The axillary and epitrochlear glands are usually affected. The diagnostic points are the resistance of the sore to ordinary treatment and the involvement of neighboring glands.

Describe the secretion of the chancre.

Scanty and serous in character, becoming purulent from irritation or from mixed infection.

What is the duration of the chancre?

Three to six weeks in the absence of treatment. It may be in existence at the time of the appearance of the first general eruption.

What is the termination of chancre ?

After the surface heals, the infiltration disappears, leaving a reddish spot, which subsequently turns white, then normal, leaving no diagnostic mark.

What is induration ?

The sclerotic process which so constantly occurs at the base of the initial lesion. There is at first a mild hyperplasia, but as the cell-increase goes on, hardening of the tissue occurs under the lesion. The inflammation may be so slight as to escape observation. Sclerosis rarely assumes its characteristic hardness earlier than the fifth day and occasionally not until the fourteenth day after the appearance of the sore. It is therefore wise to wait at least a week before announcing the character of the sore. The sore should not be cauterized during this time.

In specific induration the boundaries are defined, the nodule is freely movable, hard, firm, and resistant. In inflammatory infiltration the mass is adherent to the underlying tissue, is doughy to the touch, and its boundaries shade off gradually into the surrounding tissue. Specific induration is modified by the situation of the chancre, being well marked when in the sulcus behind the corona glandis or in the meatus. On the glans penis the induration is likely to be slight.

Describe parchment induration.

It is a thin plate of infiltration, the area of which is limited to that of the chancre.

Describe relapsing induration.

Induration may recur at the site of the inoculation, especially if on the genitals, at any time during active syphilis. The nodule may take on the appearance of any type of the initial lesion and is called chancre redux.

What are the peculiarities of chancre in women ?

Extragenital chancre is seen more often in women than in men. When on the mucous surface of the genitals in women it gives rise to little discomfort, but may be deeply infiltrated. Chancres occur, in the order named, upon the labia majora,

labia minora, fourchet, uterine neck, clitoris, vestibule, meatus urinarius, upper commissure of the vulva, and in the vagina. The common form of chancre is the erosion, and is usually unnoticed until discovered by the surgeon when examining the skin eruption.

Describe scaling papular tubercle.

This lesion is found on the outer surface of the labia majora, or upon the labia minora and prepuce of the clitoris if they are so prominent that through exposure they are invested with true skin. It is also found as an extragenital chancre in the neighborhood of the vulva. It begins as a small red papule, often scaly, which increases in size. Subsequently it becomes a dark mottled brown plate. In size it sometimes becomes 1 inch or more in diameter, but still has sharply cut edges, the shape and induration varying with the location.

Describe the elevated papule or tubercle in women.

This chancre is a distinctly marked lesion, which may be elevated or flat. It is similar to the scaly papule, and is found in the same locations, but is characterized by deep infiltration. In size it is smaller than the scaly papule, and its surface is usually smooth and deep red.

Describe incrustated chancre in women.

The peculiarities of this chancre depend upon its location in folds of skin or mucous membrane. Its secreting surface is covered by greenish crusts, although at first it has a shining white film; or it may be colored by detritus from the blood. This is the only form of chancre which leaves a permanent cicatrix.

Describe the diffused exulcerated chancre in women.

It is usually associated with filthy habits and general depravity, and involves more or less of one major or minor labium. It is a large, thickened, deep red chancre, seen most frequently upon the external genitals, and is ulcerated over its surface.

Describe chancres of the vagina.

These chancres usually occur close to the outlet and have the same appearance as the erosion in the male.

Describe chancre of the os uteri.

The os may be encircled or the cervical endometrium may be involved to a considerable extent. It is seldom multiple. It may take on any one of the forms described as chancre of mucous membrane.

Describe chancre of the breast.

Chancres are found on the nipple, and frequently multiple. They are often fissured, and are located within the areola. The incrustated and erosive types are most common.

What complications of the initial lesion may occur ?

Vegetations or warty growths are liable to spring up around a chancre if it is under the prepuce, within the anus, or between the labia, where its situation exposes it to moisture. Their presence is accidental.

May a chancre become inflamed ?

Yes, from friction of adjacent parts and from the caustics of the surgeon. Syphilitic bubo may suppurate if the process is purulent enough.

What is mixed infection ?

The *simultaneous* inoculation of both the syphilitic and chancroid poison. The chancre, having an average incubation of twenty-three days, may not appear until after the chancroid is cured ; if the life of the chancroid is prolonged it may obscure the chancreous process beyond recognition, and in the place of primary sclerosis developing under the erosion with its superficial ulceration, sloping edges, smooth shining red floor, and scanty secretion, a doughy inflammatory engorgement appears about a pustule or ulcer with abrupt undermined edges, worm-eaten floor, and abundant auto-inoculable secretion. As a consequence constitutional symptoms may follow an apparently typical chancroid.

What is an infected chancre ?

An erosive chancre contaminated by chancroid virus. In such a case the characteristics of the chancre are destroyed by the chancroid.

What is infected chancroid ?

A chancroidal ulcer inoculated with the syphilitic virus. A correct diagnosis of chancroid may have been made, but as the chancroid responds to treatment and the first period of incubation of the chancre ends, the character of the local sore undergoes a change and constitutional syphilis follows.

What is the prognosis of chancre ?

Favorable as far as it is individually concerned, because it usually heals spontaneously. Little can be done to hasten its healing. Its character, location, or duration in no way indicates the severity of the oncoming syphilis.

What is the treatment of chancre ?

If the chancre is not ulcerated, surgical cleanliness and protection is the only treatment necessary, unless it be so situated as to proclaim its victim, when it may be removed. If the chancre is ulcerated, application of black wash and surgical cleanliness and protection are all-sufficient.

What is primary adenopathy ?

The indolent swelling and hardening (hypertrophy) of those glands next to the chancre in the lymphatic system. The indurated glands resulting from the chancre are called syphilitic bubos, and the characteristic involvement in the groin is often referred to as the pleiad, which is a series of enlarged glands in the groin with the center gland larger than the others. They have unyielding firmness: little if any tenderness; are discrete and movable; the surrounding tissue shows no inflammatory reaction. In rare cases there is inflammation of the surrounding tissue involving the group of glands in a boggy mass, but the skin is not involved. This condition of boggy mass suggests mixed infection or virulent bubo from pus absorption.

Describe the change in the glands due to syphilis.

Ordinarily several glands become indurated. In size they

are smaller than those caused by inflammatory diseases, such as chancroid and urethritis; they are from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter. The statistics of venereal clinics show that the syphilitic bubo suppurates only once in one hundred and eighty-six times.

If there is no periglandular inflammation, the glands can be easily outlined and are movable under the skin.

The enlargement of the inguinal glands is usually noticeable first on the side corresponding to that upon which the chancre is situated, the opposite side becoming involved subsequently.

Slight tenderness is likely to be found early, but acute pain is complained of only in the rare cases which suppurate. The induration may have any degree of hardness or of elasticity to the touch. It appears as early as the fifth day of the chancre, but may be delayed for ten days, and acquires its maximum development in about two weeks.

Induration of the glands is not always dependent upon syphilis, and if present at the time of the examination it should be ascertained if the chancre was apparent before it appeared.

How should syphilitic bubo be treated?

Usually it is best to let it alone. Occasionally iodine locally, followed with a compress bandage, is of benefit.

When a syphilitic bubo suppurates the inflammation is not so severe as in chancroidal or gonorrheal bubo and the care of it after incision is a trivial matter compared with that of chancroidal bubo, because the discharge is not auto-inoculable. When fluctuation is felt, incise freely and keep the cavity filled with gauze until it heals from the bottom.

What is the situation of the glands involved in relation to the chancre?

Chancre of the lips and chin, submaxillary glands; chancre of the eyelids, pre-auricular glands; chancre of the fingers, epitrochlear glands; chancre of the breast and arms, axillary glands; chancre of the genital organs, those of the integument in the immediate neighborhood, inguinal glands; of the anus, inguinal glands.

Describe general glandular hyperplasia.

During the interval between the appearance of the chancre and of the first general eruption there is a gradual engorgement of the lymphatic glands throughout the body. The careful diagnostician hesitates to pronounce a general eruption syphilitic if he is unable to find definite enlargement of the postcervical and epitrochlear glands. The clinician of experience, upon seeing a diffused eruption, instinctively reaches for the back of the neck in search of the little tumors which, when found, are so characteristic. Likewise he bends the elbow and palpates for the epitrochlear glands. The infiltration of these glands is indolent and unaccompanied by the signs of inflammation; they are quite hard and are tender on severe pressure, and range in size, as felt through the skin, from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter.

Their enlargement may not take place for five or six weeks, the average time being about three weeks. They are of diagnostic value, but it must be remembered that an enlargement of these glands is not always due to syphilis, and a careful consideration is necessary to an intelligent appreciation of their relation to that disease.

What are the prodromes of the secondary outbreak?

The victim is pale and dejected, and he complains of anorexia, insomnia, muscular pains, and nocturnal headache. A persistent headache, which is worse at night, is suggestive of syphilis.

What is the constant symptom of secondary syphilis?

A general cutaneous eruption, which may be accompanied by any or all of the following evidences of constitutional disturbance: fever, neuralgia, insomnia, cachexia, analgesia, and icterus.

What is the character of syphilitic fever?

The fever may be slight or severe, transitory or persistent. It is rarely high and usually so slight that it is overlooked. It may be continuous or remittent. The continuous fever does not begin earlier than ten days preceding the first eruption. In at least half the cases in which febrile reaction is

noted there is no fever until within three or four days of the appearance of the first syphilid. The temperature ordinarily runs from 101° to 102° F. until the day of the eruption, when there is a brief exacerbation. The remittent type is important. It is most often seen months after the first general eruption, is brief, mild, and is not known to depend upon the invasion of new tissue by the morbid process. It is usually introduced by a chilliness early in the evening.

Where is pain common?

Neuralgic pains in the joints, tendons, and muscles, and osteocopic pains in the skull and long bones, which become worse at night, are very common during the evolution of the early syphilids.

Is there usually insomnia?

Sleeplessness is far from being a constant symptom except when from osteocopic pains, but is seen in nervous patients.

What are the blood-changes?

During the secondary stage the patient is usually anemic, and if he is debilitated at the time the disease is acquired there is a marked increase of the white blood-corpuscles at the expense of the red. The skin and mucous membrane are very susceptible to irritation and inflammation, and wounds and scratches are slow in healing in active syphilitic subjects.

What is syphilitic cachexia?

An adynamic condition likely to be most marked about the time of the advent of the secondary stage and during severe tertiary manifestations.

Is analgesia noticed?

A part or all of the integument may become insensible to the sense of touch, of heat, of cold, and of pain. It may persist for months. It occurs most frequently in women. Its favorite locations are the dorsal surfaces of the forearm and hands, and of the ankles and feet.

Is icterus common?

Jaundice from the occlusion of the ductus communis choledochus by tumefaction of its mucous lining occurs. It is rare.

What is hemorrhagic syphilis?

Any of the secondary eruptions of syphilis may become hemorrhagic, the blood appearing in or around each lesion. It is most often seen in those who are perniciously anemic, or are suffering from greatly depressed vitality.

What are the secondary syphilids?

The erythematous; the papular and the pustular eruptions, given in the order of their severity. Lesions of the skin may appear at any time during active syphilis. They are usually the earliest and often the latest evidences of the disease.

What are the histologic changes in the secondary syphilids?

The eruptions of syphilis are caused by chronic hyperplasia or cell-infiltration. The several hyperemic syphilids are peculiar to the secondary stage of the disease, and are therefore limited in time to the first two years following the chancre. Hyperemia is the essential morbid process to which is often added varying degrees of cell-infiltration from the almost imperceptible thickening of the erythematous syphilid to the prominent nodule.

The cells which produce the induration of chancre, of the cutaneous eruptions, and of the gummata are round, granular, nucleated bodies averaging $\frac{1}{8000}$ inch in diameter and have the appearance of white blood-corpuscles.

What is the histology of the deeper lesions?

The cell-infiltration, as a rule, increases with the age of the syphilis. In the secondary period papules are developed which have their base in the papillary and Malpighian layers of the skin, while in the tertiary period tubercles which involve the cutis and subcutaneous tissue are developed. Syphilitic gummata result from cell-infiltration in the sub-

dermal tissue, and are likely to cause ulceration of the overlying skin. The different syphilitic eruptions may occur simultaneously or a general eruption may be made up entirely of one variety.

What are the peculiarities of syphilitic eruptions ?

The syphilids are chronic and apyretic. Chronicity and absence of inflammatory features, especially itching, serve to differentiate them from non-specific eruptions. The slowness of the morbid process in syphilitic manifestations is more marked late than early in the disease. Active inflammation is seen in the eruptions of syphilis when they are irritated by friction, and in the skin over a gummatous deposit when it is about to break down and form an ulcer.

Is polymorphism frequent ?

The development of several varieties of lesions at one time is of frequent occurrence. It is more often seen early in the secondary stage, when the eruptions are most numerous, than in the late eruptions.

What are the peculiarities of syphilitic eruptions as to color and pigmentation ?

Their normal color while developing is a pinkish-red, less vivid than that of non-specific eruptions, but soon becomes brownish. During their slow subsidence they are yellowish-brown, which has been compared to the "lean of ham," to the "color of copper." During their stage of hyperemia, the spots disappear under pressure, but not after they become pigmented.

What are the characteristics of the ulcers and cicatrices ?

Syphilitic ulcers have no characteristic shape, and are not necessarily bilateral. Cicatrices are usually characteristic. They are distinct, white, smooth, pliable, and are seldom traversed by fibrous bands or depressions. There is often a persistent brownish discoloration external to their edges.

What is the first eruption of syphilis ?

The erythematous syphilid, also called syphilitic roseola,

macular syphilid, exanthematous syphilid. It is by far the most common eruption in syphilis, but in some cases is so slight, or the spots are so few, that the eruption may be overlooked. It appears upon the lateral thoracic regions, then on the chest, finally invading the flanks, and from there extends over the body, to the exclusion of the hands and feet. The lesions may be so faint as to escape notice, but usually persist and become more and more evident. The eruption is made up of round or oval spots having an average diameter of four lines. Exceptionally, they are very small. Occasionally macules of various size appear in the same eruption, and they disappear upon pressure until pigmentation occurs. In color they vary from a delicate pink to a rose or purple. Reaction from a hot bath frequently renders a faint eruption quite distinct.

The number of points of eruption in this general syphilid increases during the first ten days, each day adding new groups.

A most important and diagnostic characteristic of the macular eruption is polymorphism, a condition where, owing to relapses, there may be present the macule, papule, or even pustule, in the same eruption.

The difficult cases are those in which there is unusual systemic reaction, giving the syphilid a bright red color, which persists for days before fading to the coppery shade, but, fortunately, such concomitant symptoms as nocturnal headache, sore throat, and mucous patches aid in the diagnosis.

The macular syphilid may be distinguished from measles and scarlatina by the absence of fever, catarrhal or severe, general symptoms of vomiting, and sore throat.

From drug eruptions, especially the balsams and antipyrin, by the absence of gastric disturbances, fever, itching, large edematous points resembling urticaria, and the history of the case.

Tinea versicolor is differentiated from the macular syphiloderma by its larger lesions, slight scaling and itching, the yellow tint, and by the discovery of the vegetable fungus (*microsporon furfur*) in the scales.

Occasionally the relapsing macular syphilid, because of its circinate form, is mistaken for tinea circinata. Microscopic examination shows the vegetable parasite of the latter.

What is the corona veneris?

A pronounced eruption in a line below the roots of the hair upon the forehead. This is most likely to occur when the face is involved and the eruption is central about the nose and mouth.

What form of the erythematous eruption is seen during relapses?

The annular or circinate variety. It may occur during the first year of syphilis, appearing in rings or segments of rings and coming in a few isolated groups. There is a ten-



FIG. 64.—Annular syphiloderms (I. E. Atkinson).

dency for this eruption to become scaly. About the face, arms, palms, soles, and inner aspect of the forearms, relapses are developed in the form of round or oval patches.

Describe the papular syphilid.

This most important secondary eruption is a circumscribed infiltration into the superficial layers of the skin. It usually makes its appearance between the fourth and sixth month, but may be the first evidence of the disease noticed by the

patient, the preceding erythema and chancre having been overlooked. What has been said of fever as a concomitant symptom of the erythematous eruption applies equally to the papular form. The papular eruption may recur at any time within three years. The papules consist of distinctly circumscribed, firm, solid, nodular elevations varying in size from a pinhead to a small pea. They may be either round, flat, or broad. They may in rare cases become an inch or two in diameter. Their color cycle is the same as that of the other syphilids, at first being a bright red it changes to a brownish

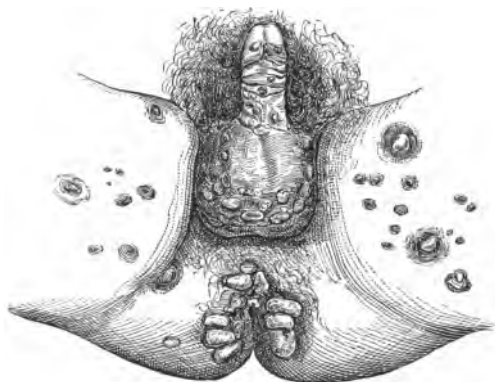


FIG. 65.—Moist papules (Miller).

or purplish red, and gradually fades. When mature, the papule is covered by a dry, tense, shining skin, which, upon desquamation, leaves a line of ragged epidermis around it. This eruption is likely to appear almost confluent between the nose and the corners of the mouth, beneath the breasts, and especially upon the forehead and about the anus and genitalia.

How many forms of papular syphilid are there?

Three: the conical or miliary, the lenticular, and the scaling papular syphilid.

Describe the miliary papular syphilid.

Two forms of this syphilid are distinguished, the small and the large. The small miliary papular syphilids are about

the size of a pinhead. They are distinctly limited, round or conical, often umbilicated, and of a deep pinkish color. They form in circles or segments of circles. The eruption begins about the face and then involves the entire body. Some of the papules are converted into vesicles or pustules.

The large miliary papular syphilids are less common than the small variety, and are often found with it. Like the small variety they are conical, red at first, then coppery. They do not occur in large numbers and are scattered over the body,

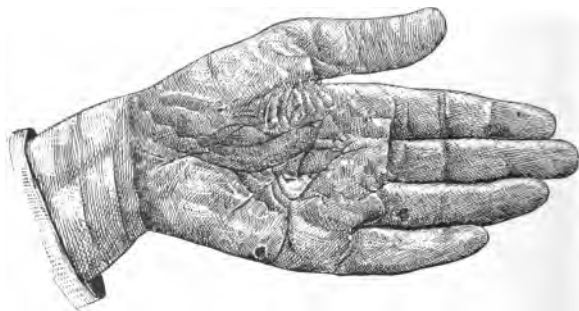


FIG. 66.—Palmar syphiloderma (Keyes).

mostly on the back and buttocks and front of the thighs and the back of the neck. They are apt to pustulate.

The miliary papular syphilid may be confused with the lichens. In lichen planus the papules are unevenly distributed, flatter, and sometimes inflammatory, and burn, itch, and form crusts.

The large flat papular syphilid, when it occurs in limited groups, may be mistaken for psoriasis, but the bright color, heavier scales, and tendency to coalescence of the patches, usually enables one to reach a diagnosis. Psoriasis is a disease of the robust, while the host of the syphilid is cachectic.

Describe the lenticular papular syphilid.

This eruption also presents two varieties, the small flat and the large flat.

The small flat lenticular papular syphilid begins as a minute red spot, which rapidly increases until it reaches the

diameter of $\frac{1}{8}$ to $\frac{1}{4}$ inch and an elevation of $\frac{1}{8}$ to $\frac{1}{2}$ of a line. The papules are either round or oval, having a flat surface and rounded and distinctly marked margins. They are at first seen about the shoulders, or at the back of the neck, or on the sides of the thorax, and are soon followed by others on the forehead and the margins of the hairy scalp, with a few on the face.

The large flat lenticular papular syphilid may be either round or oval, and has a diameter of 1 inch or more. Its history is that of the small flat variety. This form is ordinarily seen in the second or third half-year of the disease.

Describe the scaling papular syphilid.

This variety is often developed on the palms, in about the third month of syphilis, in spots which have a deep-red color, are slightly elevated, and covered by a layer of epidermis. Usually there are not more than a dozen on each hand. The feet are similarly affected.



FIG. 67.—Large pustular syphiloderm (Stelwagon).

Describe the pustular syphilid.

This syphilid ranks third in frequency, and its various forms constitute an important group. The size of the pustules varies from a pinhead to a dime, and they may take on any shape. The majority are circular, many are oval, and each rests upon an infiltrated base. They usually begin as papules, are distributed irregularly, and always become encrusted. In no other syphilid is relapse so likely to occur. In the relapses, however, the number of points of eruption is small as com-

pared with the first outbreak. They are usually grouped, and are always dilatory in development and in subsidence. The larger papules become incrustated early, the scab being greenish-black. The scabs of the smaller ones are slower in developing, and are greenish-brown in color. They are usually hard, and are detached with some difficulty. Removal of a small crust shows a papule with a point of ulceration, and under the larger ones is found an ulcerating surface of a grayish color, covered with dirty-yellow pus.

What are the forms of the pustular syphilid ?

The acneform ; the variolaform ; the impetigoform ; and the ecthymaform.

Describe the acneform pustular syphilid.

This eruption, similar to the pustular, involves sebaceous follicles and hair bulbs. The spots are minute, rarely being a line in diameter. Miliary papules are at times found mixed with them, and they may appear simultaneously with any other of the early eruptions. This eruption is usually seen first upon the face, scalp, back of the head, and on the shoulders.

The acneform pustular syphilid may simulate acne, but the latter is a disease of puberty, the first attack showing only a few points, and they are confined to the face and shoulders. Acne points are inflammatory, have no uniformity of size, and frequently furnish comedones.

Describe the variolaform pustular syphilid.

This variety is seen in obstinate relapsing cases. It is a pustule having a thin covering of epidermis which becomes umbilicated, as does the pustule of small-pox. The pustules develop rapidly, are a line or two in diameter, and owing to their development in less than twenty-four hours have little infiltration under them. Their favorite locations are the line of junction of the skin with the mucous membrane, on the scalp, and on the protected flexor surface.

This syphilid may suggest small-pox, but there is no history of rigor, lumbar pains, high fever, nor shot-like resistance in the points of eruption.

Describe the impetigoform pustular eruption.

This variety is a shallow pustule and secretes a dirty-yellow pus, forming flat, dark crusts with round edges.

Impetiginous syphilids are differentiated from impetigo by the absence of itching, by the presence of inflammatory areolas, and by their greenish crusts shading to yellow, while those of the syphilid shade to black.

Describe the ecthymaform pustular syphilid.

This variety may be superficial or deep. The time in the disease at which it develops determines its depth.

The superficial variety is seen during the first year in malignant syphilis. The eruption is composed of a great number of conical pustules from 1 to 3 lines in diameter, having a solid elevated base, surrounded by a crust, and showing a disposition to break down in open sores. The crusts which form upon these ulcers are conical.

The deep variety is common in the tertiary stage. Its appearance with the secondary symptoms is evidence of malignancy in the case. As these pustules increase in size the crusts become flattened or even depressed at the center. The base is at first of a bright-red color, which soon becomes dark-brown and is surrounded by an abruptly limited areola. Beneath the crust is an ulceration, involving the superficial layer of the skin, having a smooth floor covered with a grayish film of detritus bathed in thick pus.

The ecthymatous syphilid is unlike simple ecthyma in that it is not acutely inflammatory, pruritic, nor regular in size.

The syphilid has the darker crusts covering deeper ulcerations and is no respecter of persons, while the simple variety seeks the legs of the indigent aged. In the "submerged tenth" of large cities the inroads of the pediculosis vestimentorum (body louse) may bring syphilis to mind, but blood-clots, scratches, dirt, and a moving population clarify diagnosis.

Do the secondary syphilids leave cicatrices?

No. There is no destruction of tissue.

What is malignant precocious syphilis?

Syphilis in which the systemic poisoning is so profound that the deep lesions of the tertiary stage appear along with those of the secondary stage, within a few months of the chancre.

What are the general symptoms of precocious syphilis?

The patient shows progressive muscular weakness, complaints of eccentric neuralgias, loss of appetite, and loss of hope. Occasionally he fails to respond to treatment and sinks to death, apparently from lack of food-assimilation and inability to respond to treatment.

When does the tertiary stage begin?

This stage begins most frequently early in the third year of the disease. Any statement of the time at which any eruption of syphilis appears—from chancre to brain lesion, or any statement of the duration of the intermissions of syphilis, or the date of beginning of any one of its stages—must be qualified; for, while we know the range of possibilities of syphilis, we can prognosticate only in a general way the chronology of its manifestations.

The appearance of tertiary lesions before the late secondaries have left the field, especially relapsing papular eruptions, is not rare, and points of eruption, properly described as tertiary, are sometimes seen amidst a fading first general eruption.

What is the character of tertiary skin lesions?

As compared with the lesions of the secondary stage, they are less numerous, more circumscribed, deeper, and therefore more serious, irregularly slow and uncertain in development, and are without acute inflammatory action. They begin in the subcutaneous or submucous tissue with dense extensive infiltration which subsequently may form open sores.

Name the tertiary syphilids.

The tubercular; the ulcerative or serpiginous; the gummatous; the bullous and the rupial.

Describe the tubercular syphilid.

This syphilid resembles the large flat papule of the secondary stage with added thickness and chronicity. It is a deep, definitely circumscribed infiltration into the skin, involving its whole thickness. It may appear with the late secondary eruptions, but is usually developed between the third and sixth years and later. It generally disappears by interstitial absorption without breaking down. Its course is distressingly chronic and prone to relapse. It is a thickening



FIG. 68.—Resolutive tubercular syphiloderm in groups (Hyde and Montgomery).

which causes no pain, heat, or itching. The earlier its appearance the more numerous are the points of eruption; it is, however, usually late and limited. The large tubercle begins as a spot, which may have any shade of red and which slowly increases in size and thickness until, when fully developed, it has a diameter of $\frac{1}{2}$ inch. The smaller lesions are more elevated than the large ones, and are shining or dull, as the skin upon which they develop is thin or thick. The tubercles first appear upon the forehead or suprascapular region. They become scaly when upon the palms or soles.

Describe the ulcerative or serpiginous syphilid.

This variety creeps over large surfaces by ulcerating at the periphery while healing in the center. Although it is sometimes seen as early as the second year, it usually appears late in the tertiary stage. It is painless, chronic, and very disfiguring. It may be superficial or deep.

The superficial variety begins as a pustule, which ulcerates and then forms a yellowish-brown or greenish-black crust. Granulations persist under the crust until it falls off, leaving a narrow incrustated margin. The deep variety is likely to develop around a tuberculous or other late deeply infiltrated lesion. It is a distinctly outlined ulcer with undermined edges and covered with a crust. It may increase rapidly in size. When the lesion is fully developed and has obtained a diameter of from 4 to 6 inches its appearance is marked. In the center is a round oval patch of cicatricial tissue, having a coppery-red color. It is completely enclosed by a ring of crust. This syphilid, fortunately of rare occurrence, may appear as early as the third year.

Describe the gummatous syphilid.

This syphilid is almost invariably a late lesion. It consists of tubercular infiltrations of the subcutaneous connective tissue, varying in size from 3 lines to 3 or more inches. The great flat ones may develop as such or may result from the coalescence of a number of small ones. The large ones especially show a fondness for areas in which the connective tissue is loose and abundant. The lesions may invade the skin, destroying it so as to form an ulcer, or it may drag its weary length along as a subdermal tumor. The gummatous node rarely appears before the third or fourth year, and is exceedingly slow in development, indolent and insensitive. It may be painful in a region in which it presses upon sensitive tissue, as upon the cranium, or upon a nerve. It is more often seen upon the lower extremities, forehead, and scalp. It is circumscribed by a limiting membrane, often deeply seated, involving muscles, periosteum, or bone. The skin is not at first adherent and is involved only in the breaking down of the nodular elements.

Describe the bullous syphilid.

This eruption is the only one which confines itself strictly to the tertiary group. First is noticed an effusion of serum beneath the epidermis, which in ten days forms a bulla, perhaps 3 lines in diameter, having the appearance of pemphigus. The contents become turbid and, ultimately, yellow and thick.



FIG. 69.—Rupia (Tilbury Fox).

It increases in size, often becoming as large as an almond, the tissue immediately surrounding being dusky-red. They may develop a few at a time, and most frequently elect the arms and legs as their site.

Describe the rupial syphilid.

Rupia is the same name applied to the ulceration which covers itself with laminated crusts. It is seen in severe cases of syphilis at any time, but when occurring in the first year its number of points is usually very limited. If there are many points of rupia they are likely to be small and scattered; if there are few they are usually large and localized. Beginning as a hyperemic spot this eruption forms a flat greenish-brown crust surrounded by a line of ulceration. The secreting surface under the first crust forms crust after crust, producing the laminated scab peculiar to rupia, each lamina being larger than the one overlying it because the

ulcer persistently increases in diameter. Formed in this way the crust represents a truncated cone. Rupial eruptions ordinarily appear upon the upper half of the body. They are sometimes seen with crusts 2 inches in diameter, but 1 inch is about the average size. Like all tertiary lesions,



FIG. 70.—Gummata (Jullien).

they are slow of growth and painless, but have not the depth of the tubercular or gummatous syphilids, which involve the entire thickness of skin.

What precautions should be taken against syphilitic infection?

Knowledge of the dangers of acquiring syphilis should be widespread and the way to escape it well understood.

Coitus should not be had during the existence of abrasions of the genitals, and tearing of the mucous membrane should be avoided during the act, as these furnish ports of entrance for absorbing the virus.

Those who suffer with erosions on account of smegma should learn cleanliness, and those who have the mucous membrane denuded by maceration from the heat of a long foreskin should use daily an astringent wash, or be circumcised.

The use of the condom lessens danger of infection of the penis, but does not protect the scrotum.

Antiseptic solutions used before and after the act lessen the risk little, if any.

How may one guard against extragenital infection?

The danger of extragenital infection is decreased by the protection of breaks of continuity which are liable to absorb infection. Risk is also lessened by avoiding drinking vessels, household utensils, and various personal belongings used by others, unless they have been previously boiled. The syphilitic should provide himself with separate eating utensils, bedding, and towels. His chancre being healed the greatest danger is from his saliva, because of the frequency of mucous patches in the mouth. The secretion of any sore which appears during the first year and a half of syphilis (whether under active treatment or not) may infect one innocent of the disease.

How may the treatment of syphilis be divided?

Into abortive, local (see Conditions Due to Syphilis, page 263), and constitutional.

What is the abortive treatment of syphilis?

Early specific medication and destruction of the local sore.

Both are ineffective. It has recently been demonstrated that rubbing the point of inoculation with a 10 per cent. calomel lanolin ointment within eight hours after implantation of the virus prevents syphilis.

Should mercurials be given as soon as chancre is diagnosed?

No!

Describe constitutional treatment.

The successful management of any cases of syphilis depends upon the intelligent cooperation of the patient. This cannot be secured unless he knows that he is syphilitic. If the patient sees the eruption he will be more lastingly impressed than by the assurance of his doctor, who pronounces him leuitic from the appearance of the sore alone. While it is natural to begin treatment as soon as the diagnosis is sure, mercury given before the eruption appears *causes many failures to cure the disease*, because it clears the skin, delays and, in some cases, prevents the appearance of confirmatory evidence,

and the patient, feeling well, stops treatment, drifts from observation, and finally returns—perhaps as late as seven years—with evidences of irreparable tertiaries.

It has been said, "If in doubt, give mercury at once, to be on the safe side," but why subject the patient to prolonged treatment when there is no positive evidence of syphilis? It has been said that such treatment is frequently followed by the most brilliant results, but the probabilities are that there was no syphilis to treat. There is no doubt that the oculist, the aurist, the nose, throat, rectal, and genito-urinary specialists will have less to do if the general practitioner ceases to cauterize penile sores, refrains from snap diagnosis, and defers specific treatment until the patient fully realizes that he is syphilitic. The most approved and painstaking specific medication may prove inadequate if the patient is unwilling to conform to hygienic requirements and submit to restriction in exercise, food, and drink.

Exercise should not be carried beyond slight fatigue, and ample, regular time should be devoted to sleep. If sedentary in habit, the patient should have sufficient sunshine. The skin should be kept active by bath and friction. The Turkish bath improves sewage by the skin, but persons suffering from a wasting disease should not remain for any length of time in a room whose temperature is higher than 130° F. The patient's habits should be regular in every detail. He should take plainly cooked, concentrated food, in order that his digestive function may not be overtaxed at the time his alimentary tract must dispose of large doses of mercury.

Tobacco may be used in moderation except where there are secondary manifestations in the throat or mouth or on the lips.

Alcohol should be interdicted, as a large majority of those suffering from tertiary lesions are those who have neglected treatment while under the influence of drink.

In making a diagnosis the surgeon should study his patient in order to decide whether to tell him frankly of his condition or lead him gradually to the conviction that he is syphilitized. During the interval between the appearance of the chancre and the secondaries the patient should visit his dentist and have his mouth put in perfect order. His state of health should be ascertained, the urine examined, and any irregularity corrected. His weight should be taken and his

excretions promoted. When the diagnosis of syphilis is positively announced, the patient should be told that every symptom, in ordinary cases, can within a short time be controlled by medicine; that the deep lesions (if he has heard of them) which disfigure, or are so dangerous to life, occur only (except in the rarest cases) in those who are dissolute or neglectful; that he will not necessarily have an eruption that will betray him to his friends; and, finally, that the majority of syphilographers believe that the disease can be completely and lastingly eradicated. He should be cautioned as to the details of his home-life (see Prophylaxis), and assured that with ordinary care he need not communicate the disease to his family. The patient should be told that at least two years' treatment is necessary for a cure, and that the periods of latency, characteristic of the disease, by no means indicate its eradication.

What is the psychotherapy of syphilis?

An eminent syphilographer directs a cheerful disposition for the patient. This is both desirable and difficult to secure. His degree of cheerfulness depends principally upon the physician gaining his confidence and assuring him that his disease is not necessarily so bad as it is painted in the illuminated plates of the dermatologists; neither so inherently nasty nor speedily fatal as it appears in the advertisements of the quacks. The influence of the mind upon the body is strikingly exhibited in syphilis. The most intractable cases are those in which the patient is constantly examining himself and is despondent from anxiety.

The mental condition brought about by morbid fears known as syphilophobia has no tendency to self-limitation, and can be cured only by the surgeon being able to command his patient's confidence and by tactful reasoning to convince him that his case is curable.

What is the adjuvant treatment?

The patient should be kept at as high a standard of health as possible. Intercurrent diseases must be carefully watched for and treated. Tonics should be included in the therapeutics employed in all stages. The most useful are Blaud's mass, quinin in tonic doses, and the simple bitters fifteen minutes before each meal, Coca given after meals when

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anemia is present acts beneficially upon the heart, capillaries, nervous system, and upon general nutrition. It is essentially beneficial to patients addicted to alcoholics, and may be taken in their stead, especially when combined as follows :

R Fl. ext. erythroxylin cocæ,	3ij;
Tr. gentian comp.,	
Tr. cinchonæ comp.,	aa 3j;
Elix. calisayæ,	3iv.—M.

Sig.—One tablespoonful in water after meals.

What is the specific treatment of syphilis ?

The administration of mercury, which is known to have a selective action upon the syphilitic toxemia, and of the iodids, which influence the removal of infiltration due to the disease.

By what method is mercury administered ?

A very satisfactory way of giving mercury is by the mouth. The most-used preparation is the protiodid, in tablet or pill form. The ordinary dose is $\frac{1}{2}$ grain. Begin by giving a $\frac{1}{2}$ -gr. protiodid pill or tablet after each meal. On the second day give one after breakfast, two after dinner, and one after supper. On the third day give two after breakfast, one after dinner, and two after supper. On the fourth day give two after each meal ; continue increasing $\frac{1}{2}$ grain daily until the "limit of tolerance" is reached. This will be shown by a red line at the margin of the gums, glue-like saliva, and perhaps sensitive teeth. Mild colicky pains and diarrhea only show reaction of the mucous membrane of the intestinal tract, and often occur and disappear in spite of increased dosage some days before the mouth gives evidence that the system is saturated. In order to insure a regular increase in the amount the patient is to take, give directions in tabular form as follows :

Morning meal.	Noon meal.	Evening meal.	Total.
1 tablet . . .	1 tablet . . .	1 tablet . . .	3 tablets.
1 " . . .	2 tablets . .	1 " . . .	4 "
2 tablets . .	1 tablet . . .	2 tablets . .	5 "
2 " . . .	2 tablets . .	2 " . . .	6 "
2 " . . .	3 " . . .	2 " . . .	7 "
3 " . . .	2 " . . .	3 " . . .	8 "
3 " . . .	3 " . . .	3 " . . .	9 "
3 " . . .	4 " . . .	3 " . . .	10 "

It is rarely necessary to go beyond fifteen $\frac{1}{4}$ -grain tablets daily. The author has seen salivation from three $\frac{1}{4}$ -grain tablets daily, and on the other hand, thirty-six $\frac{1}{4}$ -grain tablets daily for weeks were borne without the slightest disturbance. If the protiodid deranges the gastro-intestinal tract so the "limit of tolerance" dose cannot be ascertained, substitute the equivalent dose of mercury with chalk. If that preparation cannot be tolerated the biniodid should be tried, and finally tablets of corrosive sublimate. The latter is well borne by some persons who are intolerant of other preparations. If mercury in any form cannot be taken by the mouth, substitute inunctions. It should not be forgotten that symptoms of ptyalism may occur in a bad mouth some time before the point of saturation is reached. To avoid this the mouth should be kept as clean as possible. A saturated solution of potassium chlorate used as a gargle several times a day is excellent for this purpose. If the gums are retracting they should be painted with glycerite of tannin.

When it is necessary to change from one form of the mercurial to another the following table of equivalents will be of use.

TABLE OF EQUIVALENTS.

Mercury protiodid.	Mercury with chalk.	Blue mass.	Corrosive sublimate.	Mercury biniodid.	Calomel.
1 gr.	1 gr.	1 gr.	100 gr.	100 gr.	1 gr.
2 " "	1 " "	1 " "	50 " "	50 " "	1 " "
3 " "	1 " "	1 " "	25 " "	25 " "	1 " "
4 " "	1 " "	1 " "	10 " "	10 " "	1 " "
5 " "	1 " "	1 " "	5 " "	5 " "	1 " "
6 " "	1 " "	1 " "	2 " "	2 " "	1 " "
7 " "	1 " "	1 " "	1 " "	1 " "	1 " "
8 " "	1 " "	1 " "	1 " "	1 " "	1 " "

What doses of mercury should be given during the absence of symptoms?

Using the "limit of tolerance" dose as a standard, the mercury may be reduced a third, or half, or gradually reduced until the patient begins to gain weight. The amount he is then taking (the "tonic dose") is the quantity he should use daily, in the absence of symptoms (if there is an exacer-

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bation run up to the "limit of tolerance" dose), for at least two years; and if at the end of the second year he has not been six months without symptoms, the mercurial should be continued until there is such an interval.

The lengthening of the treatment to three years is becoming more universal. Throughout the treatment of syphilis one should be prepared for emergencies. A precocious tertiary may develop, a secondary take on unusual activity, eye symptoms call for vigorous interference, or brain and cord demand a most rapid and profound medication. The inunction or hypodermic methods or the vapor bath, with increasing doses of the iodid of potassium, are used in such crises, and when the danger is passed the more methodical treatment is resumed.

How are mercurial inunctions used ?

Rub the ointment in the most accessible and hairless regions. In case the patient can employ a professional rubber, the back is selected. When self-administration is necessary, the following seven hairless locations will be found satisfactory :

First evening	. . . .	Inner side of right thigh.
Second "	. . . .	Inner aspect of left arm and forearm.
Third "	. . . .	Right side of thorax.
Fourth "	. . . .	Inner side of left thigh.
Fifth "	. . . .	Surface of abdomen.
Sixth "	. . . .	Inner aspect of right arm and forearm.
Seventh "	. . . .	Left side of thorax.

Before the local applications are made wash the parts thoroughly, apply a mild solution of carbolic acid, and wipe dry. After rubbing, the parts should be covered with some undergarment which should be worn during the night. In the morning the surface may be washed in cold water.

The following prescription will be found excellent for inunctions :

R Unguent. hydrarg.,
Unguent. petroli carbolat., āā ʒij.

M. et div. chart. No. xvi.

Sig.—Rub one paper in at bedtime.

(Have druggist enclose dose in oiled paper or tinfoil).

Should the official blue ointment be employed, 60 grains may be used at each friction, for adults.

Describe the mercurial vapor bath.

The patient should be enveloped to the neck in a heavy blanket, the folds of which completely surround him as he sits on a chair with a perforated seat. An ounce of calomel is placed in a metal dish which is secured under the chair and over a burning alcohol lamp. The heat displaces the mercury, and it becomes infinitesimally subdivided. Coming in contact with the perspiring body of the patient it is taken into the system. The patient should take pains not to catch cold subsequent to the bath, and the skin should not be washed for about forty-eight hours.

Give the details of the hypodermic method.

The needle and syringe should be surgically clean, the skin at the seat of the puncture should be rendered aseptic, and the needle puncture should be closed with collodion or plaster. The needle should be of very fine caliber and at least $1\frac{1}{2}$ inches long. The skin being pinched up, the needle is to be pushed gently but firmly deep into the subcutaneous connective tissue, and the fluid is to be expelled slowly. As a rule, the injection of $\frac{1}{4}$ to $\frac{1}{2}$ grain of the sublimate, every second day, will be attended with no bad results in the robust, and even a daily injection may be used. In the debilitated from $\frac{1}{20}$ to $\frac{1}{12}$ grain is quite enough. The following prescription is well adapted for the hypodermic method :

R Hydrarg. chloridi corros.,	gr. j ;
Acid tartaric,	℥ss ;
Aquæ,	℥j.—M.

Sig.—Inject 15 drops into the buttock every first, second, or third day.

What are the evidences of mercurial toxemia?

The demonstration of the drug may be mild or severe. In the mild form there is increased flow of saliva, congestion, and sponginess of the gums, which bleed easily and present a red line. When the teeth are clinched pain is experienced, showing the parts to be tender on pressure, especially about the posterior molars. There is also a marked metallic taste in the mouth and the breath is fetid. If the drug is not withheld the symptoms increase and become severe. If the dose is further increased there soon follows ulceration and

edema of the oral mucous membrane, enormously increased flow of saliva, swelling of the tongue, soft palate, and sub-maxillary glands, and, occasionally, dermatitis.

In chronic mercurial toxemia the entire digestive tract suffers. The patient becomes nervous, gloomy, depressed, weak, morose, and hysteric; has no appetite; suffers from heartburn, flatulence, eructations, and muscular debility.

What is the treatment for mercurial toxemia?

Stop the administration of mercury and use as a mouth wash a saturated solution of chlorate of potash and paint the gums with glycerite of tannin (10 gr. to 1 ounce), and give atropia to modify ptialism.

What is mixed treatment?

The administration of both mercury and the iodid of potassium or sodium. They may be given in combination or in separate prescriptions. The latter is better, for there may be indications to increase one drug without increasing the other.

In a general way the addition of the iodid of potassium to the mercurial treatment is made toward the close of the first year. The iodids are always indicated where any points of eruption are deeply infiltrated and in the various conditions due to tertiary syphilis. The following prescription is excellent when the drugs are to be given in combination:

R Hydrarg. bichlorid.,	gr. i-ij-iiij;
Potassii iodidi,	$\frac{3}{4}$ ss- $\frac{3}{4}$ j- $\frac{3}{4}$ iss;
Tr. cinchonæ comp.,	$\frac{3}{4}$ iiss;
Aquæ,	$\frac{3}{4}$ ss.—M.

Sig.—One teaspoonful after each meal, well diluted in water.

When the drugs are to be given separately but at the same time, the mercury may be given in pill or tablet form, and the iodid in tablet form or in a saturated solution, 1 drop of the solution equalling 1 grain of the iodid. The use of the mercurial ointment in local conditions, associated with the internal use of mercury and the iodid, is frequently necessary to control active lesions. The rule laid down by some authors, that early in syphilis mercury only is indicated and later the iodid alone should be given, is not in general a good one. Many cases of tertiary syphilis have remained un-

affected by the use of the iodid alone, and have improved promptly upon the addition of mercury.

The use of mercury, therefore, should not be limited to the secondary stage, nor should, in every case, the use of the iodids be limited to the tertiary stage.

Iodin preparation should always be given largely diluted, to avoid irritation of the stomach. Milk is the best diluent. Fresh syrup of hydriodic acid should be given if the stomach becomes irritated.

When combining, chemically, the yellow iodid (protiodid) of mercury with the iodid of potassium, there results the red iodid (biniodid) of mercury and metallic mercury.

When combining the red iodid of mercury with the iodid of potassium, there results a double soluble salt— $\text{Hg}_2\text{K}_2\text{I}_4$ —iodid of mercury and potassium iodid.

When combining the bichlorid of mercury with the iodid of potassium, there results the red iodid of mercury and potassium chlorid. Chemically, the second combination seems to be the rational one to use, yet, clinically, the first has been used successfully for years.

What precautions are necessary in administering the iodids?

When the iodid is to be given in increasing doses, it is well to begin with, say, 5 drops of the saturated solution freely diluted with water or milk after each meal. The dose may be increased, as shown in the table for the administration of the mercury tablets. Generally speaking, the increase of 5 grains daily of the iodid is too rapid. The dosage, however, must be regulated according to the conditions to combat and the susceptibility of the patient.

HEREDITARY SYPHILIS.

What is hereditary syphilis?

Syphilis transmitted to the child through the father or the mother. In the former instance it is called sperm inheritance, in the latter germ inheritance.

At what age does hereditary syphilis become evident?

Usually about the third week after birth. It may be present at the time of birth or remain latent for a year.

Competent observers have narrated cases in which it first appeared at puberty.

Does the age of the disease in the parent affect the prognosis ?

Yes ; its severity is in inverse proportion to the age of the disease in the parent.

Is hereditary syphilis transmissible ?

It is not handed down to the child's children. The child is protected ; a non-syphilitic may contract syphilis from the child inheriting it.

What are the peculiarities of the hereditary lesions ?

They are more active and extensive, more eccentric in their chronology and distribution than those of acquired syphilis, but are similar in that the early eruptions are more widely disseminated than the late ones. Bullous eruptions seem to take the place of those having laminated crusts ; pemphigus, which is rare in acquired syphilis, is common in hereditary, while rupia, which may appear in any month of an acquired syphilis, is not seen when the disease is inherited.

What is the prognosis of hereditary syphilis ?

If the child does not die from the exhausting effects of its syphilis or an intercurrent disease, the evidence of hereditary syphilis usually disappears by the twentieth year. Relapses late in life sometimes occur.

What is its course ?

There is no satisfactory chronological classification of the manifestations of hereditary syphilis, but in general they have the same order as those of the acquired disease.

What are the laws of inheritance of syphilis ?

From the father : A child may inherit from the father alone from the spermatozoon which impregnates the ovum. If conception occurs during the period of incubation of the chancre the child will escape. If it occurs during the period between the appearance of the chancre and the general in-

volvement of the father's glands it may escape. If impregnation occurs during the year immediately following the first general outbreak of his syphilis the child can hardly escape unless the father is under the influence of mercury at the time and the mother is kept under the same influence during gestation.

From the mother alone: A child may acquire syphilis, the mother alone being diseased. If the mother be in the early stage of syphilis the ovum will be blasted or the child born dead. The mother who develops a chancre during the first seven months of the child's intra-uterine life will convey syphilis to the unborn product. If infection does not occur until the eighth month the fetus may escape syphilization.

A syphilized ovum may reach maturity and a child be born covered with sores, but the woman is likely to abort about the fifth month from fatty degeneration of the placenta.

A woman in her second year of syphilis may have a healthy child by a healthy man, and a healthy child may be born when either of the parents are in that state of syphilis, if the mother is under active antisyphilitic treatment during the whole period of gestation.

When both parents are in active syphilis: There is little hope of a living child even under the most heroic treatment of its mother.

What is congenital syphilis ?

Syphilis acquired by the child at the time of birth.

What is Colles' law ?

The child of a syphilitic father will render its mother immune against syphilis. A natural antitoxin is absorbed from the syphilitic fetus. The mother will not become syphilitic should she suckle her babe; the non-syphilitic wet-nurse may.

What is Profetas' law ?

Healthy-born children of syphilitic parents enjoy a certain immunity against syphilitic infection.

Describe the primary stage of hereditary syphilis.

This stage occurs while the product is yet unborn and is being nourished by the syphilitic blood of the mother.

What are the secondary symptoms ?

Wrinkled skin, protuberant forehead, hoarse cry, "snuffles," often described as "syphilitic facies," and syphilitic blebs, surrounded by a slight areola, appearing upon the palms of the hands and soles of the feet.

What are the eruptions of hereditary syphilis ?

Erythematous or roseolar, papular, vesicular, pustular, furuncular, bullous, and tubercular.

Describe the erythematous or roseolar eruption.

It is the earliest and most common hereditary eruption. It appears about the third week and is preceded or accompanied by coryza. It begins upon the lower part of the abdomen as minute pink spots, which slowly become copper-colored and which disappear under pressure until the time at which their color begins to change. Within a week added crops of eruption have covered the whole surface of the body, the spots being four to six lines in diameter.

The spots often spread until they coalesce, and where folds of the skin are involved by them become more or less deeply fissured.

In other cases this eruption is so mild that it is not brought to the attention of the physician. The diagnosis often rests largely upon the irregular coppery patches existing upon the chin, neck, and nates.

Describe the papular syphilid.

It may occur previous, coincident, or subsequent to the erythematous lesions and may be mixed with other eruptions. The papules are flat, vary greatly in size, and are usually somewhat symmetrical in their distribution. They are at first dark-red, then coppery, may have a smooth surface, or the epidermis may exfoliate, especially on the palms and soles.

Describe the vesicular syphilid.

Small vesicular eruptions are seen infrequently, and in severe cases are scattered among other lesions. The smallest ones, although but about two lines in diameter, are elevated nearly a quarter of an inch above the surrounding surface. They contain clear serum and have a hard infiltration at their base. The larger vesicles have seropurulent contents. They are likely to remain discrete.

Describe the pustular syphilid.

The thighs, buttocks, and face suffer most from this variety, which generally appears before the eighth week. The pustules are a third of a line to a line in both diameters and have a dark, well-defined infiltrated base. The eruption is likely to give rise to considerable suffering, and it may be so deep that permanent cicatrices result.

This eruption has a grave prognostic value in proportion to its early appearance.

Describe the furuncular eruption.

Furuncles may appear at any time, but are usually late. They may be the first and only eruption. In character they are unique. Without evidence of inflammation they slowly grow to the size of a grape or half-walnut, their contents being those of dermoid cysts, and often with entire absence of the characteristic color and base of syphilids. They finally slough at the summit and form a ragged cavity which exudes sanious, foul-smelling pus. They are very slow in all stages and often disfigure the child.

Describe the bullous syphilid.

Pemphigus is associated with severe cases which are likely to succumb. It is one of the early eruptions, and the lesions are most numerous on the extremities, especially upon the palms and soles. The bullæ are conical, rounded, or flattened, and contain seropurulent fluid which soon becomes purulent. Distressing symptoms may arise from fissures which form in the diffuse infiltration, which occurs at the base of ulcers formed from points of pemphigus. The eruption is symmetrical and occurs but once, as a rule.

Describe the tubercular syphilid.

This syphilid is one of the later ones and is not often seen. The tubercles may be very deep papules or nodules movable beneath the skin, having a diameter of $\frac{1}{4}$ to 1 inch, and may or may not ulcerate before disappearing.

How are the mucous membranes affected?

On or before the appearance of the first eruption of hereditary syphilis, evidence of structural change in the mucous membrane of the nose is observed, coryza being one of the earliest and most constant symptoms. The tumefaction may occlude the nostrils and embarrass the child while nursing and force it to breathe by the mouth. The discharge from the nostrils is ichorous and gives rise to "sniffles."

Mucous patches are common within the buccal cavity. They are irregular grayish-white spots of necrotic epithelium, most frequently seen within the lips and on the cheeks, but may appear on any part of the oral mucous lining. They are so constant a symptom of hereditary syphilis as to be diagnostic. They are dangerous to those who kiss or give breast to the baby, because of the infectiousness of their secretion.

When does gumma occur?

During the late years of hereditary syphilis gummata are the condylomata lata, which are formed by the coalescence of papular syphilids. They are essentially chronic and prone to break down and ulcerate. These lesions require local, as well as constitutional, treatment.

Describe syphilitic teeth.

The second teeth in children born of syphilitic parents, although they may never have suffered seriously from syphilitic lesions, are likely to be ill-developed. When they first appear they are short, narrow, and thin. When developed the two central upper incisors show most marked characteristics. They are small, with narrow cutting edges, brownish color, and are ridged. They are known as "peg" teeth, or Hutchinson's teeth. They are likely to become notched, portions

of their edges breaking away, and they wear down prematurely.

Is the treatment of hereditary syphilis similar to that of the acquired variety?

Yes, but presents divergencies and difficulties, and is not followed by such uniformly good results. The syphilitic virus diminishes the vitality of the cells which form the tissues of the child. The surgeon is called upon to neutralize



FIG. 71.—Hutchinson's teeth : 1. The central upper incisors of a lad, aged fifteen years, the subject of inherited syphilis. The teeth are short, convergent, narrow from side to side at their edges, and show in each a vertical notch. 2, These teeth present similar characters. The notches, however, are less deep, whilst the narrowing from side to side is very marked. 3, The upper incisors of a girl aged seventeen years. There is a wide space between the central ones, and both these teeth, although of nearly normal length, are narrow, and show deep vertical notches. As is usual, the lateral incisors are of normal size and form. These teeth are not so typical as those shown in 1 and 2 (Parker).

this poison and at the same time promote construction by more active metabolism. The remedies are those used in acquired syphilis—the mercurials and the iodids. They often have to be used alternately or simultaneously; for, while giving mercury for its effect upon the blood, it may be necessary to suddenly push the iodid to the limit to control some bone or other deep lesion.

What treatment does the pregnant syphilitic mother require?

Much can be done for her and the unborn product. The mother should be given mercury during the whole time of

her gestation. The inunction method is to be preferred. Where antisymphilitic medication is thorough the chance for a healthy child is enhanced.

How should the syphilitic newborn be fed ?

The child should suckle its mother, or if her supply of milk be deficient in quantity or quality the babe should be artificially fed. No circumstance can justify the use of a wet-nurse unless she is immune.

How should mercury be given to infants ?

Spread from $\frac{1}{2}$ to 1 dram, according to the age, of the official blue ointment upon a flannel bandage that is wide enough to reach from the armpits to the hips and place it against the skin of the child. The flannel scratches, the child kicks about and sweats, and the mercury is rubbed in and absorbed. The bandage should be removed daily. It is frequently necessary to change to internal medication. Calomel is well borne by children, and may be given in tablet form, using $\frac{1}{10}$ -grain tablets, of which one may be given after each feeding. The bichlorid is also frequently employed in $\frac{1}{80}$ -grain doses after feeding. Mercury with chalk is well borne and may be given as follows :

R Hydrarg. cum. cretæ,	gr. i-iv ;
Sacch. alba.,	gr. xii.
M. et div. in chart No. xii.	

Sig.—One powder soon after feeding.

In many cases iodid of potassium is indicated during the treatment of early manifestations. It is well borne by children and can be given in large doses. In a general way 20 grains a day is an average amount. This drug can be given in a saturated solution, of which 1 drop represents 1 grain of the drug.

If it is desired to give the mixed treatment, it may be done by employing both the bichlorid and iodid of potassium or sodium in conjunction. The following combination is excellent :

R Hydrarg. biniodidi, gr. i;
Potassii iodidi, ℥iv;
Syr. sarsaparilla comp.,
Aque, āā ʒij.—M.

Sig.—To a child one month old 5 drops after meals, increasing 1 drop every five days; to a child over five years of age 30 drops after each meal, increasing 2 drops every third day.

Specific treatment in children should be more or less intermittent, and during the intervals it is well to administer tonics and to do everything possible to build up the general condition.

Is local treatment necessary ?

Lesions, especially fissures and ulcers, require local treatment. They should be washed with a weak solution of carbolic acid, wiped dry, kept surgically clean, and dusted with calomel. Frequently emollient applications are useful.

CONDITIONS DUE TO SYPHILIS.

What are the causes of syphilitic alopecia ?

Anemia, common to the early stages of syphilis, which starves the hair, and scalp lesions, which cause a gradual loss of hair. Alopecia usually occurs during the time of the first general outbreak of syphilis, and rarely begins as late as the end of the second year.

What are the varieties of syphilitic alopecia ?

Primary and consecutive. They may occur together, and in either the loss of hair may be slow or rapid, partial, complete or irregular, and may involve any hairy part of the body. Baldness is not permanent unless ulcerative processes attack and destroy the hair bulbs.

Primary syphilitic cranial alopecia is a general thinning of the hair, while loss of hair from other causes occurs in spots.

Consecutive syphilitic cranial alopecia follows in the train of syphilids, which interfere with the growth of the hair by involving their roots.

What is the treatment of alopecia ?

Persistence in internal mercurial medication. Dead hair should be removed by regular combing. Systematic shampooing of the scalp is essential. For the shampoo a teaspoonful of borax or ammonia in a pint of water may be used twice a week, unless there is much sebaceous matter and small raw surfaces.

The following stimulating tonic applications will be found excellent :

R	Tr. capsici,	℥j-iv;
	Glycerinæ,	℥j;
	Aquæ,	℥j.—M.

Sig.—Use as an (tonic) application.

R	Tr. cantharid.,	
	Tr. capsici,	aa ℥ss;
	Ol. ricini,	℥iiss;
	Alcoholis,	q. s. ad ℥viiiss;
	Aquæ colog.,	℥ss.—M.

Sig.—Local application (shake).

R	Quininæ sulph.,	℥j;
	Spts. myrciæ,	℥iij;
	Ol. amygdal.,	℥iv.—M.

Sig.—Apply locally (shake).

What are the syphilitic lesions of the nails ?

Onychia and paronychia. In onychia the nail proper is affected. In paronychia the matrix is first affected. These conditions usually occur during the first two years, and show wide variations and degrees of deformity.

Describe onychia sicca.

The nails become a dull-yellow color, thicken gradually, break easily, often exposing part of the sensitive tissue beneath. The nail does not drop off, and as the general nutrition improves it grows out again. This form is more often seen than separation of the nail. When the latter takes place the nail becomes greenish-brown, thickens, and begins to separate from its bed at the free border. Often the separation is complete and a new nail forms.

Describe paronychia.

Paronychia begins in the tissues about the nail, and by extension involves the nail bed and the matrix. The disease may be dry, inflammatory, or ulcerative.

Dry paronychia consists of a thickening and an exfoliation of the skin about the nail, beginning usually at the corner. The corium becomes infiltrated and wart-like. The infection is indolent, and the parts take on a yellowish color. The entire body of the nail may be involved. The epidermis may exfoliate over the first joint of the finger. This disease shows very slight, if any, inflammatory disturbance, occurs early in syphilis, and is most common in women.

Inflammatory paronychia begins at any point around the nail as a round or oval swelling of a dusky color, which is painful under pressure. The disease somewhat resembles the ordinary "run around," but is chronic. The swelling finally disappears by absorption.

Ulcerative paronychia may begin at any part of the nail as an encircling sore, and may undermine the nail so as to destroy it. If the ulceration destroys the matrix the nail is not renewed.

What is the treatment of syphilis of the nails?

Internal specific treatment should be continued. In onychia sicca the nail should be carefully trimmed and protected. In severe forms the fingers should be soaked daily in hot bichlorid solution (1 : 5000) and the parts anointed with the official blue ointment.

Paronychia and separation of the nail with exposure of the matrix are best treated by daily applications of liquor potassæ, followed by some such local application as the following :

R	Mercurial ointment,	1 part;
	Diachylon ointment,	2 parts.—M.
Sig.—Apply locally (protect).		

In ulcerative paronychia the raw surface should be exposed and touched with nitric acid or a 12 per cent. solution of nitrate of silver, and followed by wet bichlorid dressings (1 : 2000), especially if there is swelling. Subsequently an antiseptic powder should be used or blue ointment applied.

Profuse granulations of the matrix may require cutting down with caustic potash—1 dram to 1 ounce of water. Goulard's extract is at times very useful. The iodids should be added to the internal medication during this deep-seated inflammation.

Describe syphilitic lesions of the mucous membranes.

These lesions are the same as those of the skin, except as they are modified by the more delicate structure of the mucous membrane, and by warmth, moisture, and irritation. Mucous membrane manifestations show greater activity than eruptions of the skin, owing to the more abundant blood-supply. During the secondary stage the lesions are superficial erosions, and in the tertiary, ulcerating gummata.

Describe erythema of the mucous membrane.

Erythema may occur at any time during the course of syphilis, particularly during the first month. It is more frequently seen during the general roseola, but may precede it. Congestion of the mouth and throat from the inhalation of dust, exposure to inclement weather, or from the use of tobacco increases the likelihood of its appearance. In the fauces the manifestation is often diffused, but has a definite line of demarcation and gives rise to little discomfort. Occasionally the mucous membrane takes on a milky appearance, its epithelium detached in spots.

Describe mucous patches.

Mucous patches, also called mucous papules or plaques, are the earliest and most frequent and obstinate evidence of secondary syphilis. They consist of flat or slightly convex whitish elevations whose surface resembles mucous membrane. Their secretion is highly contagious. They are usually found on the mucous membrane of the genitals, anus, and mouth. They occur at times where the reflection of the integument upon itself forms a natural fold. Mucous patches are frequently situated upon the inside of the cheek, upon the lips, tongue, pillars of the fauces, hard or soft palate; the nostrils; the umbilicus; opening of the nates; the vulva; the base of the nails. The lesion consists of a hyperplasia and a pro-

liferation of cells in the mucous layer ; the epithelium on the surface of the patch remains intact or becomes detached, the surface being depressed by ulceration or raised by further development of papillæ.

What are condylomata lata ?

A modification of the papular syphilid, represented by the moist papule or mucous plaque of the skin, which by hyper-



FIG. 72.—Condylomata of the anus (Taylor).

plasia of the papillæ becomes vegetating. They begin as small red spots, whose epidermis being removed by friction leaves a moist grayish surface which is finally converted into an elevated disk of reddish or grayish color, with an offensive and highly contagious secretion.

What is the treatment of erythema ?

It needs no special treatment beyond antiseptic astringent applications.

What is the treatment of mucous patches?

If topical applications of silver (40 grains to 1 ounce) fail, a 40 per cent. aqueous solution of the acid nitrate of mercury, or a 95 per cent. solution of carbolic acid may be used. When they are buccal the mouth should be frequently rinsed and the throat gargled with a saturated solution of chlorate of potash. Tobacco should be interdicted.

What is the treatment of condylomata?

Cleanliness is important. The parts should be protected by the interposition of gauze dressings dusted with some such powder as calomel. Large condylomata may be curetted, cauterized, and dressed dry. If the tumors are pedunculated they may be lifted and snipped away, and the stumps dusted with drying powders. They may be cauterized and dressed dry. In lesions of the vulva antiseptic injections at least twice a day are necessary.

What are the syphilitic lesions of the mouth?

Erythema, papules, vesicles, buccal mucous patches, and leukokeratosis buccæ.

Describe these lesions.

During a general papular syphilid papules are often seen in the mouth, but vesicles are very rare because moisture and friction break them down as they form. Habitual smokers are likely to have papules at the angles of the mouth. They consist of an accumulation of epithelial cells, which become whitish in color and in some cases form fissures or erosions.

Buccal mucous patches are known by their grayish-white color. Mucous patches are irregular in outline and, as a rule, not perceptibly elevated above the surface. They may occur in grayish rings with a healthy center.

Leukokeratosis is most frequently seen upon the buccal mucous membrane between the opened teeth. It begins as an opalescent irregularly shaped patch which increases in size by extension or by blending with new ones until the entire surface is involved. The epithelium appears soggy, swollen, and fissured, white near the center, and portions may

be exfoliated, leaving a raw bleeding surface. Smokers' patches, similarly located, have very much the same appearance.

What is the treatment of secondary lesions in the mouth?

Constitutional medication must be pushed. Local treatment is practically the same as for mucous patches. Hygiene of the mouth is essential.

How may syphilis affect the tongue?

By erythema, mucous patches, and fissures, sclerosis and gummata. These conditions are quite susceptible to treatment, but prone to relapse, especially in smokers.

Erythema may involve the entire tongue or be limited to patches scattered over its surface.

Mucous patches are generally found on the sides of the tongue, and are more painful than similar lesions on other mucous membranes.

Fissures are the result of erythema or mucous patches, and are situated on the sides or dorsum of the tongue.

Sclerosis, a late manifestation, usually develops after the fifth year of the disease, if at all, and generally appears on the dorsum. Superficial sclerosis produces a parchment-like induration. It may be circumscribed or diffused, and is prone to ulcerate when irritated. Deep sclerosis may involve both mucous membrane and muscular tissue, and belongs to the tertiary stage. Newly formed fibrous tissue retracts, dividing the tongue into islands separated by deep fissures. In the beginning, while the deposition of the fibrous matter is going on, the tongue may be hypertrophied. The sclerotic tongue is prone to ulcerate, especially at points where rough teeth irritate it.

Gummata of the tongue are late manifestations, and may be superficial or parenchymatous.

Superficial gummata commence as small nodules, which soften, ulcerate, and have an infiltrated base covered with a yellowish-white pellicle.

Parenchymatous gummata begin as small nodules in the muscular tissue, which soon ulcerate, leaving deep cavities

with sloughing, undermined walls surrounded by an indurated areola.

Gummata of the tongue grow slowly and painlessly upon the dorsum, and interfere but little with its function. Gummatus ulcers are generally multiple, doughy, and painless. The lymphatics are rarely enlarged.

What is the treatment of syphilis of the tongue?

For erythema and mucous patches, already given; for sclerosis the iodids should be added to the internal treatment and pushed vigorously; for gummata increase the mixed treatment, the iodid pushed to the limit. Locally, the parts should be kept clean, a 1:1000 bichlorid solution being an excellent wash. Cauterization is often necessary, especially if there are fissures.

What is the important syphilitic lesion of the palate?

Gummatus infiltration. It may occur in the hard or soft palate. This is a late lesion and of grave importance because of frequent irremediable injury.

Describe gummata of the hard palate.

They begin in the periosteum or as nodules in the mucous membrane and, unless checked, involve the bony walls and destroy them by ulceration. Sometimes the nasal fossa is first involved and the hard palate destroyed from that side. The characteristic appearance is that of a tense elastic swelling, seen along the middle line of the hard palate. This soon softens, ulcerates, and leaves the bone bare. Even after exposure of the bone the disease can be frequently checked by energetic treatment. In the absence of treatment the partition between the nasal and oral cavities will slough.

Describe gummata of the soft palate.

Gummata may be deposited in a circumscribed flattened almond-sized mass within the substance of the soft palate and between its buccal and nasal surfaces, or may appear as a diffused infiltration. The velum is thickened, its mucous membrane reddened, and its mobility impaired. In either case there is danger of loss of the palatine plate, which often

occurs without the destructive process having given rise to urgent symptoms.

What is the treatment of gummata of the palate?

Treatment should be both constitutional and local. The former consists in full doses of mercury and the pushing of the iodid of potash or sodium. Locally, there should be surgical cleanliness, and silver nitrate or carbolic acid should be applied to the edges of the opening.

What is the danger in syphilis of the nose?

Great destruction and deformity, owing to the highly



FIG. 73.—Flattening of the nose from destruction of the cartilaginous septum by syphilitic disease (McKenzie).

organized and delicate structures being attacked by deep syphilitic infiltrations.

Describe syphilitic rhinitis.

This condition may be acute or chronic. It differs from the non-specific form only in the excessive deposit of connective tissue, and the often rapid transition into the cirrhotic or atrophic stage.

What are the secondary lesions of the nose?

There may be erythema and mucous patches, but they are not common, and have no peculiar characteristics.

What are the tertiary lesions of the nose?

Gummata and diffused infiltration; deep and fibrous degeneration.

Describe gummata and diffused infiltration.

They are most common on the septum and floor of the nostrils, the posterior nares and turbinated bodies, although they may appear at any point. Deep destructive ulceration develops usually from the disintegration of gummatous infiltration.

Describe fibroid degeneration.

Fibroid degeneration is seen most often in the depraved, degraded, habitual criminal class. It attacks by preference the turbinated bodies. These bodies are enlarged, appearing dense, hard, yellowish-white or red, and are converted into pedunculated, sessile, fibroid polypi, which obstruct the nasal canals. They may ulcerate.

Destruction of the bones of the nose is limited to the turbinates, or may be complete. Common sequelæ are perforation of the cartilaginous and bony septum and of the palatine roof, caries and necrosis of bone, ozena, and extension of the disease to the antrum and to the bones of the face and skull. Cases of resulting brain and meningeal involvement with death have been reported.

What is the treatment of syphilis of the nose?

Internal specific treatment should be pushed vigorously, with the iodids in excess. Local treatment of rhinitis calls for the measures adopted in the treatment of catarrhal inflammation. Mucous patches, condylomata, gummata, and diffused infiltration are best treated with nitrate of silver. Deep destructive ulcers heal quickly under local treatment with iodoform. Dead bone which has any attachment should not be removed.

Are the secondary lesions of the throat important?

Not by comparison. The description of syphilis of the mouth will apply equally to them.

What are the tertiary lesions of the throat?

Gummata, diffused infiltration, and ulcerations. Gummata and diffused infiltration have been described elsewhere. Superficial ulcers appear rather early in the general disease, and deep ulcerations, though they may appear early, properly belong to the tertiary stage of the disease. The posterior portions of the lateral walls are the most common seat of the lesions, which have the general appearance of similar lesions of the mouth. The cicatrices of healed ulcers often cause great deformity of the pharynx and soft palate.

What is the treatment of syphilis of the pharynx?

Ulcerations are to be treated locally as described for ulcers situated elsewhere. Constitutionally, mercury should be given in moderate doses and the iodids pushed. To derive the best results from local treatment the parts should be thoroughly cleansed by disinfectant sprays and the cleansed surfaces touched direct. Iodoform generally gives the best results, especially when the ulcerations are deep.

Describe syphilitic lesions of the larynx.

Laryngeal lesions are insidious, chronic, painless, irregular in the time of their appearance and severity, and usually result from faulty early treatment. The lesions are superficial and deep, depending upon whether they appear early or late.

Lesions of the secondary stage are all superficial, and are: erythema, mucous patches, superficial ulcerations, chronic inflammation, and vegetations. The lesions of the tertiary period are: gummata, fibroid degeneration, deep ulcerations, and perichondritis. The above forms, except vegetations and perichondritis, have been described elsewhere. Cicatricial contraction following laryngeal lesions may not only permanently affect the voice but may even endanger life by forming a web-like constriction of the parts.

Describe vegetations of the larynx.

Vegetations are little cauliflower-like growths. They may spring from the margins of an ulcer or from the mucous membrane.

What is the treatment of vegetations?

Constitutional treatment should be pushed. If the growths are large and embarrass respiration, and are not controlled



FIG. 74.—Fresh gummata on the epiglottis and syphilitic infiltration of the right true vocal cord and ventricular band (Grünwald).

by constitutional treatment, they may be removed by direct applications.

Describe perichondritis of the larynx.

Perichondritis results from bulging of an inflammatory or ulcerative process in the mucous or submucous tissue. The cartilage thus becomes surrounded by a purulent infiltration. If caries occurs, necrotic portions are expelled as granular detritus or as a well-formed sequestrum.

The entire cartilage may be destroyed. Recovery takes place, but there is impaired function. The disturbance in laryngeal syphilis may extend from a slight modification of the voice to most extensive destruction of tissue and deformity of the organ.

Give the treatment of syphilis of the larynx.

Treatment should be both constitutional and local. The former consists in moderate doses of mercury with full doses

of iodid of potassium. Local treatment consists of thorough surgical cleanliness. The ulcerations may be dusted with iodoform. The bichlorid spray is useful. If there is alarming obstruction tracheotomy may be demanded. If loose plates of cartilage interfere with respiration they should be removed.

Describe syphilis of the trachea.

Syphilitic lesions of the trachea are similar to those in the larynx. Ulcers forming gummata may cause stricture. The principal symptoms are purulent expectoration and dyspnea. If stenosis occurs it is usually just above the bifurcation.

What is the treatment of syphilis of the trachea?

Constitutional and local. The former consists in moderate doses of mercury with large and increasing doses of the iodids. Local treatment consists of inunctions of mercury over the thyroid cartilage, and the inhalation of calomel, iodid of zinc, or iodine, in the form of a spray. It may be necessary to dilate or divide the cicatrices following ulceration.

May syphilis attack the genito-urinary organs?

Yes, especially the body of the penis, the epididymis, and the testicle proper.

Describe syphilis of the corpora cavernosa.

The disease usually appears as nodules, situated well forward in the pendulous portion of the penis. They may interfere with erections, but are otherwise painless.

What is the treatment of syphilis of the corpora cavernosa?

Constitutional, the administration of mercury in moderate doses, the iodids in full amount. Locally, mercurial inunctions.

Describe syphilis of the epididymis.

Syphilitic disturbances of the epididymis usually occur early, but may be as late as the fifth year. The lesion, which is slow and painless in its growth, consists of a smooth, hard, round, or oval, movable tumor, the size of a pea or bean, and

usually attacks the globus major. It yields to mixed treatment and rarely degenerates. The testicle should be smeared with mercurial ointment and supported by a suitable bandage. Sometimes effusion into the tunica vaginalis needs to be aspirated.

Describe syphilitic orchitis.

Late syphilis of the testicle proper is rather common. It may occur as early as the fourth month, but in the majority of cases it is a tertiary lesion, appearing several years after infection. One or both testicles may be involved, either at the same time or consecutively. There are two forms. Sclerosis of the connective tissue, and gummatous formation.

Describe syphilitic sclerosis of the testicle.

The organ is somewhat enlarged, but painless, causing little inconvenience. There is often an accompanying hydrocele. At first there may be little projections upon the surface of the testicle, which progress, fuse, and form a hard tumor resembling the normal testicle. Ultimately the testicle contracts and atrophies.

Describe gummatous orchitis.

Gummy material is deposited in masses through the testicle, which is much increased in size. The organ is hard and dense, painless, but degeneration is common. The contour of the testicle is usually regular. When degeneration begins the scrotum becomes adherent, red, and glazed. There usually follows a destructive fungus-growth of the testicle.

What is the treatment of syphilitic orchitis?

The constitutional treatment should be pushed, with mercury in moderate doses and the iodids in excess. Local applications of mercurial ointment are indicated. Usually, if the fungus is large, castration is necessary.

Describe syphilis of the rectum and anus.

The most frequent secondary manifestation about the rectum and anus is the mucous patch which occurs in various forms. They are the red papule, fissure-like cracks, small,

round, gray patches, elevated or vegetating patches. The tertiary lesions are gummata and infiltrations.

Describe the small red papules.

These are slightly elevated and generally multiple. They appear on the mucous membrane, but may involve the mucocutaneous junction. They break down and form ulcers.

Describe the fissure-like crack.

It occurs between the radiating folds of the anus, appearing doughy or granulated, and is covered with a dirty secretion. Fissures are not accompanied by inflammatory deposit and leave no scars.

Describe the small, round, gray patches.

They occur upon the mucocutaneous and cutaneous surfaces just within the anus and are generally dry, not elevated, and multiple. If there is much thickening at their base they are likely to leave a white cicatrix.

Describe the elevated mucous patch.

This condition occurs as a papular eruption, adhering with a broad base, and more or less inflammation and thickening. The patches secrete an abundant fetid fluid which irritates the surrounding parts. The fluid may irritate the papillæ over which the patches are situated and cause them to enlarge. When the papillæ enlarge they branch upward, their vessels multiply and dilate, the summit of the growth increases in width, while the base remains the same, and there is developed the cauliflower-like growth distinguished as vegetating mucous patches, venereal warts, or condylomata lata. With its change of character it requires, in addition to antisyphilitic remedies, surgical interference.

Describe the ulcerations.

The ulcerative lesion occurs more frequently in the secondary period as a local inflammatory effusion. As infiltration occurs they break down, leaving ulcers which bleed easily but are not very painful. They are generally situated

just at the verge of the anus or between the radial folds, where they appear as fissures.

Describe the gummata.

They are rarely seen about the anus, but occur in the rectum, where they are the most frequent cause of stricture. They are globular, elastic, cellular deposits in the submucous tissue. They may be single or multiple, small or large; at first they are not attached to either the mucous or muscular wall of the gut, but later involve both. The deposit of fibrous tissue continues until it encroaches upon the caliber of the gut.

What is anorectal syphiloma?

A fibrous infiltration of the rectal wall. It begins in the subcutaneous tissue and is essentially a hypertrophic proctitis, tending to a sclerotic stage. Digital examination shows a thickened, leathery, inelastic condition of the rectal wall, more or less nodular and extending usually 3 to 5 inches upward from the anus. After contraction there follows ulceration which involves the mucous membrane above the strictured portion. Ulcerations are probably due to abrasions.

Give the treatment of syphilis of the anus and rectum.

By employing the inunction method considerable irritation of the alimentary tract may be avoided. The local treatment for the secondaries consists in surgical cleanliness, the protection of the parts, stimulating and soothing applications. Dry dressings are called for. The tertiary manifestations must be met by the combined method of treatment, the mercury given by inunction, and the iodids, in excess, internally. Ulcerating gummata in the rectum should be curetted and treated with irrigations. Yellow wash or a 1 : 5000 bichlorid solution is the best antiseptic. If the gut is contracted it should be dilated with rectal bougies. Rectal stricture, so common a sequence of the infiltration from gumma and fibrous deposit, should be treated constitutionally and locally. The local treatment may consist of dilatation or division of the stricture and applications of mercurial ointment. Thorough surgical cleanliness is important.

How may syphilis affect the nervous system ?

By producing meningeal inflammation and exudation, tumors, and changes in the arteries and nerves.

Syphilitic lesions, such as exostoses and necroses, situated on the inner table of the skull or located somewhere along the spinal column, may by pressure excite inflammation of the membranes, finally producing morbid changes in the brain or cord substance.

Strictly speaking, syphilis of the nervous system is not syphilis of nerve tissue. The lesion involves primarily the membranes, vessels, or connective tissue. The process impairs function and produces degeneration of the nerve cells.

Syphilitic nervous affections may develop at any time between six months and twenty years after the appearance of the initial lesion. They are more likely to appear in men than in women, occurring from the twentieth to the fortieth year. Persons suffering from previous nervous affections are quite susceptible.

What structures are commonly affected in syphilis of the nervous system ?

The brain and cord and their coverings, the arteries and nerves. The lesion in the brain and cord is always secondary to syphilitic affection of the meninges, bones, or blood-vessels, softening frequently being the pathologic change.

The dura mater, either cerebral or spinal, is very likely to be involved by syphilitic disease, the change being characterized by thickening due to cell proliferation. This membrane may be attacked alone or the process may also involve the inner table of the skull, that part of the membrane enveloping the base of the brain being, however, oftener affected than any other portion.

The arachnoid and pia mater are also involved in the pathologic process.

When the brain becomes syphilized the lesion is more frequently located at the base, in the anterior and middle fossæ.

Syphilis of the arteries at the base of the brain is common and produces obliterative arteritis, which impairs the blood-

supply to the brain substance with resultant softening of the parts affected.

The cerebrospinal nerves are frequently involved by pressure from inflammatory exudate and gummatous deposit, which produces various sensory and motor symptoms.

The cranial nerves principally affected are the third (motor oculi) and sixth (abducens) pairs; the second (optic), first (olfactory), and fourth (pathetic) pairs may be affected, while the seventh (facial) pair is rarely attacked. Syphilitic subjects occasionally manifest symptoms of disseminated neuritis, which evidences involvement of the peripheral nerves. As the result of syphilitic poison the sympathetic nerves may undergo degeneration and atrophy.

What is the common lesion in brain syphilis?

Gummatous meningitis.

What are the earliest and most constant symptoms of brain syphilis?

Severe and more or less persistent headache, nausea, and vomiting. After a short time there may develop an attack of hemiplegia, frequently accompanied by cranial nerve palsies. Optic neuritis is at times seen. Coma, epileptoid attacks and somnolence are accompanying symptoms. Mental deterioration, as evidenced by impaired memory, undue irritability, lack of power of attention, and tardy process of reasoning, is particularly seen when the convexity is attacked.

What is the character of syphilitic tumors of the nervous system?

They are grayish-red in color, highly vascular, and consist of small round cells imbedded in connective tissue; they subsequently by degeneration become yellow and hard. They vary greatly in size and number and occur chiefly at the base of the brain, near the Sylvian fissure. The cord and medulla usually escape.

Describe syphilitic hemiplegia.

Hemiplegia is of frequent occurrence in syphilis of the brain, and ordinarily appears before the tenth year. Its pro-

dromata are severe localized headache, vertigo, mental disturbance, and convulsions.

Motor function in some cases is but slightly disturbed, but the loss of power may be complete.

Complete hemiplegia may come on suddenly or gradually. In cases of gradual onset the patient is cognizant of muscular weakness.

Hemiplegia may slowly improve, but the opposite side, or the same side, may be attacked subsequently.

The disturbance of general sensation is rarely prominent, but occasionally there is loss of both motion and sensation.

May epilepsy be due to syphilis?

Yes. It is quite common in cerebral syphilis, and practically the same symptoms as in the non-syphilitic disease are present.

The prognosis is less unfavorable in the specific variety.

Describe syphilitic paraplegia.

Paraplegia is a common form of spinal syphilis. The onset is usually slow, and is characterized by progressive paralysis involving the lower extremities, and is attended with much pain.

Sensation may be abolished or exaggerated.

Loss of control of the rectum and bladder is common.

Under the most favorable conditions the symptoms may disappear slowly.

Paraplegia, like hemiplegia, is usually a late manifestation.

May locomotor ataxia result from syphilis?

Yes. In about 70 per cent. of all cases of this disease there is a history of syphilis.

The symptomatology and treatment are the same whether resulting from syphilis or other causes. The prognosis is in any case bad.

Describe general paresis due to syphilitic infection.

The disease usually manifests itself by a period of excitement or irritation, succeeded by dementia and paralysis.

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In a smaller proportion of cases there is a prolonged period of depression and hypochondriasis instead of the excitement of the first stage of the typical disease.

In other cases the patient passes into a slowly progressive dementia without the previous stages of excitement or depression.

The first symptom shown in the common type is a change in disposition. The patient becomes irritable and is affected by trivial annoyances. He becomes easily fatigued, shows a lack of interest in affairs, and his judgment is impaired, as is often demonstrated by faulty business transactions. This state is followed by one of mental exaltation. He is happy and possesses delusions of grandeur. He makes extravagant purchases, and imagines himself possessed of immense wealth, enormous strength, and great power of control.

During this stage there may be violent outbreaks of excitement. The physical symptoms are tremor, hesitating and thick speech, pupils uneven and irresponsive to light, weakness of the bladder and sexual function, and inco-ordinate staggering gait. The knee-jerks are either exaggerated or abolished. Vertiginous and apoplectic attacks and epileptoid convulsions occur.

Insomnia is prominent. The appetite remains good. In a short time distinct evidences of dementia are shown. The patient becomes more quiet and there is a tendency to somnolence; at this time he fails to recognize his best friends, shows no interest in things about him. There is complete disorientation. He becomes filthy in his habits and must be looked after constantly. He finally becomes bedridden and dies from exhaustion. Three years is the average course of the disease, though cases may terminate within a year or be prolonged fifteen years.

What is the general treatment of syphilis of the nervous system?

Syphilitic disease of the nervous system almost invariably depends upon pressure from a syphilitic deposit, therefore the iodids are demanded in increasing quantity until the symptoms yield or the patient becomes intolerant of the drug.

The author gave to an aged patient suffering from gumma of the brain 360 grains of iodid of potassium daily for ten days with apparent benefit. The dose of a mercurial that is his limit of tolerance should be administered also.

What are the forms of syphilitic involvement of the muscles?

Irritative, interstitial, and gummatous myositis.

Describe irritative myositis.

The muscle becomes hyperemic and tender to pressure or movement, but shows no evidence of inflammation. The affection usually passes for muscular rheumatism, the pain being of the same sort. After a time it disappears entirely with or without specific treatment.

Describe interstitial myositis.

A chronic infiltration, usually about the end of the first year, of small cells of the connective tissue uniting the fasciculæ of the muscle. Ultimately the infiltrate hardens and destroys the muscle substance by pressure, which causes atrophy. The deposition of cells is attended with pain. The muscle contracts longitudinally as well as in its transverse diameter, and may continue to do so for years. The flexor muscles, especially those of the upper extremities, are most often attacked.

Describe gummatous myositis.

A painless and deliberate infiltration of the muscles which may become markedly indurated or break down and discharge through the skin. The large muscles are usually affected.

What is the treatment of syphilitic myositis?

Mixed—with the iodids in excess. Mercurial inunctions may be applied over local areas, and any softened spots may be opened freely.

Describe syphilitic bursitis.

Early syphilitic bursitis consists in a mild congestion or slight effusion; late lesions consist of gummatous infiltration.

The bursa may not be primarily involved, but becomes affected from adjacent tissue.

What is the treatment?

Large doses of the iodid of potassium and moderate doses of mercury are necessary. The joint involved should be properly immobilized.

What bones may be affected by syphilis?

Any bone of the body may suffer from syphilitic infiltration early or late, in either acquired or hereditary syphilis. The frontal and parietal bones, the ribs, the sternum, the clavicle, and the tibia are most liable to be affected early.

In what locations do the lesions occur in the bones?

In the medullary canal or the periosteum. The deposits are pinkish-white or gray in color, and are vascular-like granulation tissue. The tumors or nodes vary in size from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter and may be $\frac{1}{2}$ inch in height. They are round, smooth, hard, and immovable.

Describe osteoperiostitis.

This lesion consists of a fluid or gelatinous infiltration of the bone and its covering.

The nodes under proper treatment generally undergo resolution, but the skin may break down, forming an ulcer. The infiltration may form an exostosis in the periosteum or a true hypertrophy of the bone.

Describe osteomyelitis.

This syphilitic infiltration commonly occurs in the long bones, attacking the medullary canal, but may be seen in any part of the bone. If the skull is attacked necrosis and perforation occur from the deposit breaking down in the diploë.

What is the treatment?

The same as that for other dangerous tertiary lesions already described.

Describe the joint-symptoms of the secondary stage.

Pain in the large joints is one of the frequent early manifestations of syphilis. The lesion is a specific inflammation of the synovial membrane and fibrous tissue. There may be at times an effusion into the joint, and there is often pain, which is worse at night, and slight stiffness; and if the cartilages are involved, slight crepitation of the articulation.

Describe synovitis.

This affection is seen in the tertiary stage as a chronic effusion into the joint, which becomes stiffened, painful, and swollen. The effusion develops deliberately as does the gummatous thickening of the joint-tissue. Crepitus indicates that the cartilage is involved. Ankylosis occurs in rare instances.

What is the treatment of synovitis?

It is the same as for deep tertiary lesions. When the knee, which is the favorite point of attack, is the part involved, it is sometimes necessary to use a posterior splint. Early treatment is usually successful.

How may the fingers and toes be affected?

By gummatous infiltration, the connective tissue and fibrous structure of the joints or the periosteum or bone being involved. It appears in two forms. First, that in which both the subcutaneous connective tissue and fibrous structure of the joints are involved; and second, that in which the disease begins in the bone or its periosteum, and extends to the articulation.

Describe the superficial form of dactylitis.

Its presence is shown by gradual and painless enlargement of a finger or toe. If a toe be affected each phalanx is involved, while in the finger the proximal phalanx alone suffers, except in rare cases. The swelling, red in color and most marked on the dorsal surface, increases in degree until the movement of the joint is impaired. The course of the disease is slow and, if untreated, ends in the loss of the joint from erosion of its cartilages.

Describe the deep form of dactylitis.

A gummatous deposit appearing as a periostitis or osteomyelitis. Its course may be quite irregular and involve the phalanx as a whole or only its articulating surfaces. In the rare cases in which these tumefactions suppurate the abscess appears at the side of the digit. When necrosis of the bone



FIG. 75.—Syphilitic dactylitis (Chapin).

occurs there results a shortening of the finger. The thumb, index and middle fingers are favorite locations for dactylitis. This affection is painless and occurs five to fifteen years after infection.

What is the treatment of dactylitis?

Mixed, with the iodids in increasing doses. Mercurial ointment applied to the affected member is called for. Operative interference is rarely necessary, but immobilization of the joint is sometimes desirable.

In what way may the eye be affected by syphilis?

Any of the ocular tissues may exhibit forms of acquired or hereditary syphilis; the superficial tissues may show primary, secondary, or tertiary lesions, and the deeper structures are subject to secondary and tertiary manifestation. It is not always possible to differentiate hereditary from acquired, nor secondary from tertiary forms, nor can syphilitic changes always be differentiated from conditions due to other dyscrasæ.

What manifestations are seen in the superficial tissues of the eye ?

The skin, conjunctiva, and cornea may be the site of a primary sore (chancre¹) most frequently seen about the inner aspect, margins of the lids, caruncle, or plica semilunaris, because infection is most frequently conveyed by the fingers, which seek this region in rubbing the eye. The custom in certain localities of removing foreign bodies with the tip of the tongue furnishes a means of infection.

These tissues may also show the various secondary eruptions precisely as seen in other parts of the body, and their treatment differs from that employed elsewhere only as indicated in the note for soft sores. A sunken bridge of the nose may give the appearance of deformity of the lids, and proptosis, with caries of the lacrimal processes and orbital plates, may result in more or less destruction of tissue, pus formation, and consequent deformity, the treatment of all of which must follow general surgical lines with constitutional measures.

A form of granular conjunctivitis similar to trachoma may be due to syphilis, and yields to antisypilitic measures with local cleansing and astringent applications.

What is the most common and important syphilitic affection in this locality ?

Interstitial (or so-called parenchymatous) keratitis, which may depend upon hereditary or acquired syphilis—usually the former—and may also be due to other hereditary taint. From 30 to 60 per cent. of all cases are due to hereditary syphilis, and the majority develop before the fifteenth year. Instances have occurred of its evolution *in utero*. The existence of cicatrices about the mouth, notched incisor teeth of Hutchinson, and broad, flat nasal bridge point to syphilis as

¹ Condylomata and chancreoid of the skin and conjunctiva have been observed, and their treatment is the same as when occurring elsewhere, with the addition of such measures as would tend to prevent involvement of deeper structures by pus infection and inflammatory traumatism—namely, hot or cold applications (avoiding lead salts), unirritating antiseptic washes, and atropin if the integrity of the cornea is threatened. Cicatrices will remain, and an effort should be made to prevent the formation of symblepharon and other deformities.

the cause of this trouble in a given case, while glandular enlargements—hypertrophied tonsils and adenoids—are more indicative of tubercular origin; both conditions may, of course, exist in the same subject. In the absence of special indications unusual tolerance of iodids may serve somewhat to point to the cause.

What are the signs and symptoms of interstitial keratitis?

After a few days of lachrimation and photophobia with slight pericorneal injection, the cornea shows a greater or less area of cloudy infiltration, usually near or below the center, with corresponding impairment of vision, which spreads toward the periphery by the accession of new patches of similar infiltration until the entire cornea, with the exception of a small marginal zone, may resemble ground glass. Close examination with a lens reveals the individual spots or foci, over which minute straight blood-vessels with angular branches are formed in numerous aggregations, making the characteristic "salmon patches," which remain until after absorption is well under way. Pain, photophobia, and lachrimation become intense in many cases, though at times they are surprisingly absent. These symptoms will increase, in spite of treatment, often for several weeks. Their subsidence marks the stage of resolution, which occupies from two to six months, but the limit of absorption requires from one to three years, the cornea gradually clearing, as a rule, from the center. The disease may begin in both eyes, but usually one eye is affected first, the second eye, however, almost invariably following in from a week to a few months.

What is the treatment for interstitial keratitis?

In the early stages irritants are to be avoided; later, they are useful. Hot fomentations for ten minutes every two hours and atropin 1 to 4 grains to the ounce instilled from one to four times a day, or in sufficient strength and frequency to maintain constant mydriasis without producing toxic symptoms. Cocain is to be avoided if possible on account of its tendency to render the superficial epithelium brittle. It is better to resort to mild opiates internally or a 1 or 2 per cent. solution of β -eucain. In some instances dionin is effective

in 5 or 10 per cent. solution—strong enough to produce some conjunctival chemosis; frequently it is not tolerated. Complete rest in bed in a moderately darkened room is occasionally advisable when pain is severe. Under such circumstances iced applications for a short time may be serviceable. Relief from pain is a very important factor in shortening the period of irritation, and a liberal use of opiates may be needed. Upon the subsidence of this period stimulating applications are indicated. The preparation most used for this purpose is a carefully triturated ointment of yellow oxid of mercury, from 1 to 5 per cent. (usually 2 per cent.), a small portion being placed within the lids by means of a sterile probe or smooth glass rod, to be followed by gentle but firm rubbing through the closed lids once a day for a period of many months. Atropin should be continued until the injection subsides, and hot fomentations may be used with advantage two or three times a day for several months.

As soon as returning vision permits, errors of refraction should be closely corrected. From the outset active supportive and alterative treatment is to be instituted on the lines of antisymphilitic routine in general, depending on the individual peculiarities of the case. As soon as tolerance for light is established the eye should be protected by shades or dark glasses and the patient turned out of doors. If adenoids or other pharyngeal or nasal abnormalities exist they should be thoroughly removed, and the upper respiratory passages kept clean by means of sprays and local applications of 2 per cent. silver nitrate or 10 to 30 per cent. argyrol. In the presence of these latter conditions, cod-liver oil may be added to the iron, mercurial, and iodid medication with advantage.

What is the prognosis of interstitial keratitis ?

Recovery is protracted, but usual, if treatment is well directed and persistently carried out. Recurrence is not frequent when the disease is syphilitic. Concomitant affections of the deeper tissues may take place, resulting in corresponding impairment of function. Ulceration of the cornea rarely occurs, except from neglect or injury, requiring cauterization and the use of antiseptic irrigations.

In what way may syphilis affect the subconjunctival connective tissue?

In the form of episcleritis, resulting in the development of a purplish elevated patch, usually about $\frac{1}{4}$ inch in diameter, a short distance from the cornea. If due to syphilis these lesions, though always protracted, will yield to constitutional treatment, local applications of cocain or boracic acid solution being indicated only to relieve symptoms. Subconjunctival saline injections and yellow oxid ointment may possibly hasten absorption.

What are the manifestations of syphilis in the iris?

Plastic, serous, and interstitial iritis, and gumma, which occur in an average of about 3 per cent. of all cases of acquired syphilis, and frequently in the congenital form. From 30 to 60 per cent. of all cases of iritis are syphilitic. One or both eyes may be involved at the same time or at longer intervals, but there is no such uniform involvement of the fellow eye as in interstitial keratitis.

Through the formation of synechiæ acting as sources of irritation, recurrences are apt to take place, and if the synechiæ are annular (complete) secondary glaucoma is apt to supervene, necessitating an iridectomy.

What are the characteristics of plastic iritis?

The disease appears usually from the second to the tenth month after the initial lesion; seldom as a primary attack after the eighth month; but in hereditary syphilis, while it may appear in the early months of infancy, it may be delayed for many years; when seen in early childhood plastic iritis is usually syphilitic. Aside from the common manifestations of all inflammations of the iris, pain (usually severe and deep-seated, but sometimes singularly slight), photophobia, and some perturbations of vision with pericorneal injection of greater or less intensity, the iris is sluggish, pupil contracted, adhesions to the anterior lens capsule form in a few days (posterior synechiæ), which, under the influence of mydriasis show uneven dilatation of the pupil, and plastic lymph is deposited on the capsule in the pupillary space at

an early stage, producing corresponding impairment of vision; the surface of the iris becomes dull, but the cornea and anterior chamber remain clear.

What are the characteristics of serous iritis?

In addition to the common symptoms mentioned, the aqueous becomes turbid, and the posterior surface of the cornea (Descemet's membrane) is stippled with numerous minute spots, usually in a triangle at the lower margin, forming one of the varieties of punctate keratitis. The pupil may be dilated rather than contracted, and, while the iris is sluggish, adhesions form slowly, although the fibrinous deposits take place on the anterior capsule. The ciliary body is frequently involved in this form of iritis, constituting an iridocyclitis, or so-called anterior uveitis. Intra-ocular tension is at first increased, but later becomes diminished, except upon the super-vention of secondary glaucoma.

What are the characteristics of interstitial (parenchymatous or gummatoid) iritis?

One or more small elevations are seen in the inflamed iris between its attachment and free border which are smoother than the adjacent tissues, from infiltration or edema, of a yellowish tint and crossed by fine vessels. Upon their absorption or scars nor atrophic areas are seen.

What are the characteristics of gumma of the iris?

This is a late manifestation of syphilis, and occurs almost always at the pupillary border of the iris. It is a solitary nodule of a pinkish or yellowish tint, and may involve the entire substance of the iris. After absorption scars and atrophic areas are left.

What is the treatment of syphilitic iritis and gummata?

Absolute rest in bed, except in mild cases, with most active constitutional remedies. If a previous course of mercury has not been given, it should be instituted at once, in the form of inunctions, to the point of incipient ptyalism. At the same time, in severe or grave types of the disease, or later, if con-

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ditions admit of a few days' delay, full doses of iodid of potassium are to be employed.

In adults it is well to begin with 30 grains well diluted, three times a day before meals, and if tolerated, push to 1 or 2 drams, remembering that every hour is of vital importance to the preservation of function of the eye. As soon as adhesions of the iris are separated and in the early stages of serous iritis, treatment may be less vigorous and later take the usual forms in general use for ordinary syphilitic manifestations, with tonics and general hygienic regulations.

It sometimes happens that salicylates may be advantageously combined with iodids, perhaps because a syphilitic subject may have a rheumatic iritis.

Opiates and sedatives should be used liberally. Locally, hot fomentations for ten minutes every hour or two during the most active stage, with due regard to rest, are of value, or dry heat may be employed by means of gauze dressing and a Japanese stove or hot-box. The artificial or natural leech to the temple is frequently employed.

From the first, atropin should be used in sufficient strength and frequency to obtain complete and, if possible, symmetrical mydriasis. It is best to begin with a 1 per cent. solution repeated in two or three hours, watching the effect on the iris and general system. If it is preceded by cocain, its effects may be enhanced. In ordinary cases a drop or two of a 1 per cent. solution, three or four times a day, is sufficient after the first two or three instillations; it may be increased in frequency to every three or four hours, and in strength to 3 or 4 per cent.

Much care is needed in the use of these stronger solutions to restrict toxic effects. The head should be turned away from the median line and a finger held over the inner canthus if possible, allowing all superfluous solution to escape at once by the outer canthus. If atropin is not tolerated, scopolamin, $\frac{1}{5}$ to $\frac{1}{2}$ per cent.; duboisin, 1 to 2 per cent.; or homatropin, 4 to 6 per cent., may be substituted.

If the synechiæ are very extensive, and especially in recurrent attacks, close watch must be kept for the supervention of symptoms of glaucoma; tension must be compared to the fellow eye if it is not diseased. Sudden increase of pain,

limitation of the visual field, or further impairment of vision, together with a peculiar steamy appearance of the surface of the cornea, are significant. Under such circumstances the atropia must be stopped, cocain, 10 per cent. solution, and adrenalin, 1 : 1000, may be substituted, and even a few tentative instillations of $\frac{1}{5}$ to $\frac{1}{4}$ per cent. solution of eserin may be employed.

If the complicating symptoms do not rapidly subside, iridectomy is to be considered.

What relation does the ciliary body bear to these conditions?

In general terms what is said of the iris applies to the ciliary body as regards conditions and treatment. It is rarely affected alone.

What manifestations of syphilis occur in the choroid?

The choroid forming part of the uveal tract (with the iris and ciliary body) is subject to invasion by any conditions affecting this tract, which is the principal vascular coat of the eye, and therefore readily accessible to all morbid constitutional conditions elsewhere.

Choroiditis occurs as a secondary or tertiary lesion of acquired syphilis or as a manifestation of the hereditary form, and with it the retina and vitreous body may be involved as well as the iris and ciliary body, the lesions being frequently congenital.

What forms of choroiditis are most characteristic of syphilis?

Diffuse exudative, central circumscribed, and disseminated choroiditis (choroiditis areolata), the last being most frequently hereditary, and secondary involvement of the vitreous in the form of flaky or shreddy floating opacities, and especially aggregations of minute dust-like opacities, being more indicative of the acquired form. It must be remembered that other constitutional diseases may also cause similar appearances.

What are the appearances of diffuse exudative choroiditis?

The ophthalmoscope shows patches of yellow exudate of varying and irregular sizes and shapes, sometimes discrete,

but usually coalesced in places, which later undergo atrophy and reveal a glistening white base (the sclera), accumulating masses of pigment in their substance or about the margins. The retinal vessels are seen running over these areas unless the retina becomes involved, in which case the pigment is heaped up over its vessels. Involvement of the vitreous (hyalitis) is shown by the presence in its substance of the floating opacities already mentioned. The areas of choroidal infiltration are for the most part permanent (entirely so when atrophy and pigmentation have taken place) and cause corresponding scotomata in the visual field, which are in most cases the only symptoms complained of, aside from more or less asthenopia. When the inflammation of the choroid has been severe and extensive in the earlier years of life, especially if congenital or occurring in infancy or early childhood, and commonly when associated with inflammation of the iris and ciliary body, an anterior or posterior polar cataract is apt to result, but such cataracts may occur without involvement of the choroid.

What are the appearances of central circumscribed choroiditis?

The exudate with its subsequent atrophic and pigmentary changes involves the macular area only and produces a corresponding central scotoma. This form of choroiditis is perhaps the least characteristic of syphilis and the least likely to be accompanied by changes in the vitreous.

What are the appearances of disseminated choroiditis?

This form of choroiditis is perhaps the most characteristic of hereditary syphilis; it usually affects both eyes, and the ophthalmoscope shows deep, more or less circular, patches of pigmented exudate throughout the fundus, rarely involving the retinal stroma. These patches are apt to be of rather uniform size, usually of about $\frac{1}{4}$ to $\frac{1}{2}$ "disk diameter."

What manifestations of syphilis occur in the retina?

Syphilitic retinitis, either diffuse or central, with or without involvement of the optic nerve, vitreous and other structures, and pigmentary degeneration of the retina—the latter

condition as an hereditary lesion, either congenital or beginning in childhood ; the two forms either as hereditary or acquired manifestations.

What are the characteristics of diffuse syphilitic retinitis ?

In acquired syphilis the disease is apt to appear about two years after the initial lesion. Vision is impaired by concentric limitation of the field if the nerve is involved, or by the formation of scotomata of various forms, metamorphopsia and photopsia, sometimes with nystagmus and night blindness. The ophthalmoscope shows more or less numerous yellow or white patches of infiltration—some of which become pigmented—and the vessels are tortuous if the nerve is involved, with more or less general grayish cloudiness ; later, the vessels are shriveled and the disk may become pale. Vitreous opacities are common, especially in the posterior portion of the body, spread out in a fine dust-like mass. Hemorrhage may occur, but is not common.

The disease when once begun is essentially chronic and may lead to extensive destruction of tissue and complete blindness. As in choroiditis, posterior polar cataract may occur. Relapses are common.

What are the characteristics of central syphilitic retinitis ?

Vision is usually impaired by a central or paracentral scotoma, with metamorphopsia. The ophthalmoscope shows a number of small spots of infiltration, sooner or later with some pigmentation in the macular region. This form is especially liable to recurrence.

What are the characteristics of pigmentary degeneration of the retina ?

This condition is either hereditary or begins early in childhood, and its relation to syphilis is not unequivocal. It results in impaired vision and, in the majority of cases, blindness. Central vision may remain quite good after the field has been narrowed to a very small area. Defective illumination produces undue interference with vision (night blindness), and nystagmus is common. The ophthalmoscope shows characteristic deposits of small stellate intermeshing masses

of pigment, beginning toward the periphery of the fundus, especially the temporal side, and gradually encroaching upon the macular area, with attenuation of vessels and, finally, more or less atrophy of the papilla. The condition is chronic and treatment probably of little value. In other retinal affections treatment with iodids, mercury, and tonics should be pushed vigorously.

What general condition of the vascular system depending upon syphilis may be seen in the retina ?

The retinal vessels often afford the opportunity of observing the earliest indications of arteriosclerosis.

What affections of the optic nerve occur as manifestations of syphilis ?

The optic nerve may be involved either primarily or as a secondary condition dependent upon cerebral gumma. In the former condition either the papilla (papillitis) or nerve trunk (retrobulbar neuritis) may be affected, or both ; in the latter the disturbance is due to interference with circulation from pressure, and is the most frequent cause of the appearance commonly designated as choked disk.

The adjacent retina may be involved in the process, constituting a neuroretinitis. This manifestation of syphilis is usually, if not always, the result of the acquired form, as a secondary or tertiary lesion. There is no distinguishing feature in these disorders to stamp them as syphilitic, and the diagnosis must be made by corroborative evidence and exclusion.

What are the features of inflammation of the optic nerve ?

Vision may or may not be perceptibly impaired, and the impairment may be slight or marked, sudden or gradual. Close examination of the field detects an unusually large normal blind spot and impairment of field for colors, especially red and green.

The ophthalmoscope shows a varying degree of swelling of the disk, with obscurity or loss of its outline ; the arteries may be submerged at the disk, but where seen are either

unaltered or attenuated; the veins engorged and tortuous, dipping into the retinal stroma in places.

There may be hemorrhages, which are usually superficial.

As the affection subsides the disk shows the appearances of atrophy, except when dependent upon cerebral lesions, which are removed before trophic disturbances become profound. The treatment is constitutional and must be vigorous.

What manifestations of syphilis occur in the ocular muscles?

The intrinsic and extrinsic muscles of the eye show various paralysees (ophthalmoplegia), due to affections of nerve-trunks or branches and to central gummatous deposits or (rarely) hereditary syphilis. In cases of external ophthalmoplegia syphilis is reputed to be the cause in more than 50 per cent., and the external rectus and levator palpebrarum are the muscles most frequently affected.

By far the greater number of these lesions are nuclear.

What are the symptoms of ocular paralysis?

Ophthalmoplegia interna affects the ciliary muscle, producing impairment of accommodation, or the iris, producing dilatation of the pupil, or both. Ophthalmoplegia externa affects the levator of the upper lid, producing ptosis, and the recti, producing corresponding diplopia and strabismus in the form of a true paralysis with impaired motility, which must be carefully differentiated from the ordinary spastic squint, in which the deviation involves little or no loss of motility.

When due to syphilis these palsies are very amenable to treatment, which should consist largely of maximum dosage of iodids; but recurrences are very likely to take place. During the course of the affection prismatic corrections and exercise may be of great assistance.

Operative measures are rarely called for or justifiable.

What disturbances may occur in the middle ear?

The middle ear is not frequently attacked, but the inflammation may travel by continuity of surface from the throat. Mucous patches may develop in the Eustachian tube or upon the walls of the middle ear. Thickening or destruction of the drum may occur, followed by loosening of the ossicles or

caries of the bony wall. Patency of the Eustachian tube is often lost, the acuteness of hearing being impaired thereby, and osseous growths and polyps may destroy the usefulness of the ear.

May the internal ear be affected?

Yes. Syphilitic invasion is usually late in the secondary period and is sometimes consecutive to disease of the middle ear.

Cases of sudden deafness due to syphilis usually occur in the earlier years of the disease or as hereditary manifestations, the ears frequently being affected simultaneously by an exudate into the labyrinth involving its entire structure or individual parts. The auditory nerve may be affected primarily, or secondarily from a gumma or basilar meningitis, in which case tinnitus and vertigo are not prominent. In all lesions involving the inner ear or perception mechanism the upper tone limit is apt to suffer first, and bone conduction suffers relatively more than air conduction. Where the cochlea alone is invaded, tone-gaps may occur. Cortical deposits may produce psychic disturbances.

There is a sense of fulness in the ear, with tinnitus, and vertigo to a degree which produces staggering, but usually no pain.

Give the treatment of syphilis of the ear.

Constitutional and mixed—with the iodids in excess, and pilocarpin to the point of producing physiologic symptoms in diseases of the inner ear; and surgical cleanliness, with surgical measures for drainage when indicated in diseases of the middle and external ear.

THE CHANCROID.

Define chancroid.

Chancroid is a specific, local, contagious, auto-infectious venereal ulcer.

By what other names is chancroid known ?

Simple sore ; soft chancre or *ulcus molle* ; non-indurated ulcer.

The Germans call chancroid "the chancre," and to the sore of syphilis, which we call chancre, they give the name "initial lesion."

Is chancroid a germ disease ?

Yes. It is caused by the streptobacillus of Ducrey. The micro-organism described by Ducrey and Unna is a short, thick bacillus, with slight rounded extremities ; occurs often in clusters, sometimes in groups, either in the cells or between them, and is readily stained with borax-methyl-violet, methylene blue, or with carbol-fuchsin.

Is chancroid a local or constitutional sore ?

Chancroid is always a local lesion, causing no systemic infection or reaction. It never leads to syphilis. It is limited to the point of inoculation and to the lymphatic ganglia in immediate anatomic relationship. Exceptionally in the aged and in the debilitated, the chancroid may creep from its original focus. Its action depends upon the virulence of the infecting organism and lack of resisting power in the tissues involved. Chancroid is perpetuated only by contagion ; but sexual intercourse is not essential. Chancroid produces chancroid.

What is the frequency of chancroid ?

Chancroid outnumbers chancre four to one in the clinics, but in private practice the preponderance is reversed.

What is the period of incubation ?

There is no fixed period. The sore usually develops between the first and tenth days. When the incubation is protracted the virus has been retained before inoculation occurs.

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What is auto-inoculation ?

The power of the chancroid to reproduce itself upon the same person, time and time again, from its own virus. This characteristic is an important diagnostic point between the filth sore and the chancre.

Does the chancroid protect against a subsequent infection ?

Not at all.

How many forms of infection are there ?

Two—direct and mediate. In direct infection the disease is transmitted from one person to another in the act of coitus or intimate contact ; in mediate infection some foreign substance, itself unaffected, serves as a vehicle for the transmission of the disease—such as a contaminated towel, the nozzle of a syringe, sponges, or surgical instruments, etc.

What conditions are requisite for infection ?

A break in the epidermis or epithelium, such as a chafe, tear, a mucous patch, an ulcerated herpetic vesicle, the open mouth of a follicle ; or the infecting agent may be entrapped within the folds of a mucous membrane or skin surface when heat friction and moisture produce enough maceration to allow its entrance.

Can a man contract chancroid from a healthy woman ?

Yes. The woman may have had recent connection with a man suffering with chancroid. The secretion is lodged in the healthy vagina. The second admirer absorbs some of it through an abrasion ; the woman not having an abrasion escapes, or the woman may have had only a purulent discharge which, entering an abrasion and accompanied by severe inflammation, produces the chancroid upon the genitals of the man.

Where are chancroids usually located ?

One chancroid in one thousand is extragenital. In the male the sore often presents itself near or upon the frenum, in the sulcus behind the glans, upon the mucous membrane surface of the foreskin, at the meatus, at the preputial margin, upon the skin of the penis, and sometimes within the urethral canal.

In the female the fourchet is very commonly the seat of the chancroid, the integumental surface of the labia majora and minora, also their mucous membrane surfaces; at the meatus urinarius, and upon the skin of the thighs and perineum.

What are the general characteristics of chancroid?

The chancroid begins as a red spot, and the mucous membrane or integument surrounding it is bright-red in color. By the second day a papule forms, and by the third day a pustule develops. The pustule soon breaks, and beneath is found a deep suppurating ulcer, which extends. By the end of the first week the sore becomes deep and crater-like, with perpendicular and undermined edges. The development is more rapid on mucous membrane and raw surfaces than upon the skin, which offers greater resistance.

The chancroid is moderately painful, more so than the chancre, is often multiple and itches. When fully developed it is usually circular in outline with edges abrupt and sharply cut, floor uneven and covered with a grayish secretion and studded with minute elevations. The discharge is abundant and purulent. There is an inflammatory edema or thickening of the tissues around and beneath the sore, which shades off gradually into the surrounding parts, differing from the induration of the chancre, which is hard and firm and sharply limited. The tendency of the sore is to enlarge its area.

Name the varieties of chancroid.

Follicular, erosive, ecthymatous, phagedenic, gangrenous, serpiginous, and elevated (*ulcus elevatum*).

Describe follicular chancroid.

The pus entering the mouth of a follicle produces a little furuncle. It is hard, dusky-red, elevated, and painful. Ulceration soon takes place and an irregularly rounded punched-out ulcer follows, attended with inflammatory infiltration.

Describe the chancroidal erosion.

An erosion being present, its entire surface becomes chan-

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croidal and the ulcer takes an irregular outline, ragged edges, and infiltrated, with a slight areola. The surface of the sore is worm-eaten and covered with a grayish membrane formed of necrotic tissue, infiltrated with pus.

Describe the ecthymatous-form chancroid.

The chancroid from exposure to air becomes covered with a scab composed of dried secretion.

What is phagedenic chancroid?

One which ulcerates rapidly and extends beyond ordinary limits, in an erratic destruction of its margins, thus changing the circular aspect of the typical chancroid to one of irregular outline.

What is gangrenous chancroid?

One where there is unusual destruction from excessive inflammation. The slough may extend far beyond the original point, and result in loss of surrounding tissue. This variety is usually found in the aged, the debilitated, and in persons who are suffering from syphilis.

What is serpiginous chancroid?

One which destroys tissue in one direction while healing in another. The surface of the sore is uneven and covered with a thick, pultaceous, and grayish secretion, through which the florid granulations protrude and bleed easily upon being touched. The secretion is copious, thin, sanious, and contagious. The sore is extensively undermined, and cases have been reported where the whole skin of the penis as far as the pubes was affected. The skin is occasionally undermined as far down as the knees or upward upon the abdomen. Often ulceration will seem arrested, when it will start again, destroying all new tissue formed.

What is the ulcus elevatum?

A chancroid characterized by marked inflammatory infiltration—more limited than usual—vegetating above the surrounding surface and resembling the chancre very closely.

Describe the peculiarities of chancroid depending upon their location.

Chancroids of the skin usually originate in a follicle, and frequently extend to the loose cellular tissue, undermining the skin around a small opening.

Chancroids on the frenum are very painful and persistent. They bleed easily, and may destroy the frenum and give rise to a fistula.

Urethral chancroids, while rare, are sometimes seen. They may arise from the lips of the meatus or may be situated as far within the canal as the fossa navicularis.

Chancroids of the urethra in the female may destroy the posterior wall of that canal and open backward into the vagina.

Chancroids at the fourchet are very painful and hard to cure, owing to the parts being subjected to tension.

Chancroids of the os uteri are rare. They may, when present, occupy one or both lips or involve only a portion of the cervix. They cause little discomfort, and are usually discovered during treatment for chancroids of the vulva.

Chancroids of the anus and rectum are rare in men, but more frequently encountered in women, owing to the ease with which the chancroid secretion flows over the perineum from a chancroid located about the vulva. In the male chancroids of the rectum and anus are usually caused by sodomy. Chancroids in this location are very painful, and, owing to the constant irritation produced by the sphincter muscle and the repeated soiling from stools, are very persistent and hard to cure.

What is the treatment of chancroids?

Should chancroidal infection be recognized at the time of the inoculation, the point of entrance should be immediately cocaineized, thoroughly opened, curetted, touched with a strong caustic—fuming nitric acid, or pure carbolic acid—and dressed surgically. The wound should heal by granulation.

As a rule, the chancroid is well advanced before the surgeon is consulted. Under these circumstances the treatment is divided into constitutional and local.

The constitutional treatment consists in raising the standard of general health, bearing in mind the possibility of syphilitic taint. Tonics, judicious exercise, attention to the rules of hygiene, and concentrated and well-cooked food are essential. Constitutional treatment is necessary in the treatment of phagedenic, serpiginous, and gangrenous chancroidal infections. These highly refractory forms are frequently benefited by immersion in a hot bath or the application of hot bichlorid dressings. Morphin should always be given in sufficient quantity to quell the unusual irritability always accompanying them.

The local treatment is based upon surgical cleanliness and clearing away chancroidal granulations. If the chancroid is small and located upon the skin, it may be lifted up and snipped off, the base cauterized, and the wound dressed dry. If on the mucous membrane and small, it may be carefully cauterized down to healthy tissue and dressed dry. In the treatment of a more extensive chancroid, or one of long standing, not only its floor should be cleaned of granulations, but the undermined edges should be thoroughly curetted and cauterized, or even entirely cut away if they can be spared. The least particle of chancroidal tissue left in the wound is sure to reinfect the entire surface. After-treatment consists in the prevention of scabs, and promoting healthy granulations. Peroxid of hydrogen or a solution of bichlorid, 1:2000, is an excellent wash, and may be applied through an atomizer under 25 pounds' pressure. Chancroids on the skin may be dressed wet, those on the mucous membrane dry.

Chancroids on or near the frenum should be handled carefully. Avoid all unnecessary motion of the parts which stretch the frenum, thus lessening the liability of its utter destruction. If the frenum is eaten through and ulceration still uncontrolled resort to radical interference, so as to avoid the formation of a urethral fistula. In all chancroids which the prepuce will cover dress with gauze interposed between the glans penis and the foreskin.

Urethral chancroids in the male should be cleansed by introducing a small soft catheter into the canal beyond the sore, flushing with some mild antiseptic solution. A weak

solution of peroxid of hydrogen or a 1:1000 solution of bichlorid is an excellent cleanser. After the ulcer is cleansed equal parts of iodoform and boracic acid, or either powder alone, may be blown into the urethra or deposited directly through an illuminated endoscope. Cleansing and topical applications should be used after each urination.

The ulcer may be curetted and touched with caustics direct, through the endoscope. After any radical interference swathe the penis in hot cloths and keep it elevated.

Urethral chancroids in the female are dealt with as for those in the male, bearing in mind that the actual cautery, the curet, and active caustics should be used with discretion in order to avoid the formation of a fistula.

Chancroids on the fourchet and about the vulva may be treated with less circumspection, as there is no likelihood of fistula formation. Chancroids of the os uteri may be treated radically. The parts are not overly sensitive and can be handled with considerable freedom.

The actual cautery may in some cases be used. The vagina should be thoroughly packed after each treatment.

Chancroids of the anus and rectum in the male are difficult to reach on account of the sphincter muscle. Stretching of this muscle is justifiable if treatment is painful or unsatisfactory.

The treatment of chancroids similarly situated in the female is practically the same; the eversion of the rectal wall by introducing the finger into the vagina and projecting it through the anus seems an unnecessary procedure.

In both the male and female the rectum should be thoroughly flushed with some antiseptic fluid, the ulcers exposed, dried, and treated locally, as elsewhere indicated.

What are the principal complications of chancroid?

Bubo, lymphangitis, phimosis, and paraphimosis.

Describe chancroidal bubo.

An inflammation of the nearest gland or glands connected with the chancre by the lymphatics. It is always due to the absorption of the chancroidal poison through the lymph vessels, and occurs during the early or progressive stage of

the chancroid. Bubo commonly appears in the glands below Poupart's ligament. The glands lying near the middle line of the body to the right and left of the symphysis generally escape. Adenitis from lesions of the foot or leg attacks primarily the glands just below the saphenous opening in the course of the long saphenous vein. Bubo occurs in about 25 per cent. of all cases, and is generally single, forming on the side corresponding with the seat of the lesion; but this is not constant, as the bubo may be multiple and occur in both groins. This is especially so if the chancroid is situated in the median line, as upon the frenum. Chancroidal bubo is called virulent because the pus it contains is capable of reproducing a chancroid. The walls of the chancroidal abscess become covered with a grayish diphtheritic deposit; the edges are everted and undermined. Prior to the bursting of the abscess its course is the same as that of the simple inflammatory bubo, because its pus is confined.

What is the treatment of chancroidal bubo?

Usually the enlarged gland is painted with iodine and a compress bandage adjusted, or an ointment composed of equal parts of mercury, iodine compound, and belladonna may be applied. The weight of a shot-bag may be used in the hope of aborting the inflammation. Usually the bubo suppurates. When practical it is better to enucleate the glands that may be involved before the formation of pus.

When suppuration has taken place the bubo must be treated surgically. Prepare the parts and puncture with a small-bladed knife at the most prominent part of the abscess wall, deep enough to establish the flow of pus. By means of gentle pressure—the bubo is very painful—force the pus out of this small opening. Inject the cavity with dioxid of hydrogen; then syringe with a solution of bichlorid, 1:5000, until the fluid comes away clear. Finally inject the cavity with iodoform ointment. A small glass P. P. syringe is filled with the ointment by drawing out the piston entirely from the barrel, and filling the latter as a capsule is filled with quinin. Insert the plunger and then gently force the ointment into the abscess cavity until it is comfortably distended. Apply a cold bichlorid compress, which will seal the opening. Apply a

bandage and put the patient to bed. If pus forms again the treatment is to be repeated. If three or four treatments fail to cure, resort to a free opening of the abscess and pack with iodoform gauze. The after-treatment is rational.

Describe chancroid complicated by phimosis.

The chancroid is subpreputial; it may be on the mucous membrane of the foreskin or about the glans penis. The phimotic foreskin increases inflammation and interferes with the treatment. Under these circumstances the ulcer may eat away the foreskin and circumcise the penis or destroy the glans in a wonderfully short time.

What is the treatment of chancroid complicated by phimosis?

When the symptoms are moderately severe and the space between the foreskin and glans can be ballooned by injections from a syringe, and the ulcer reached and treated, the interference is practically the same as laid down for chancroids located elsewhere. If retraction of the foreskin and direct medication of the ulcer is impossible, resort either to partial circumcision—the dorsal incision—or complete removal of the foreskin. The object is to expose the ulcer for topical treatment. The author has performed complete circumcision in a number of cases with very satisfactory results.

Describe chancroid complicated by paraphimosis.

If paraphimosis follows manipulation to expose a subpreputial chancroid, or from failure to replace the foreskin immediately after each treatment, the constricting band adds greatly to the pain, creates great congestion and edema and renders treatment very difficult. The vitality of the surrounding tissue is lessened, in consequence of which the ulceration is rapid and destructive, a condition warranting immediate surgical interference.

What is the treatment of chancroid complicated by paraphimosis?

If reduction is impossible or not thought advisable, cauterize the ulcer thoroughly and then incise the constricting band.

After the strangulation is relieved the swelling subsides rapidly under hot bichlorid dressings. Use every precaution to prevent chancroidal infection of the newly cut surface.

What is chancroidal balanoposthitis ?

A chancroidal infection of the mucous-membrane lining of the prepuce, and also of the mucous-membrane covering of the glans penis.

Inflammation is always severe and destruction rapid. Often phimosis follows, so treatment must be active.

If the glans can be exposed by retracting the foreskin, and the act is not very painful after the exposure of the ulcer, the treatment is the same as for chancroids located elsewhere. Circumcision frequently shortens the time of treatment in a very satisfactory way.

What is chancroidal lymphangitis ?

An inflammation of the lymphatic channel connecting with the chancroidal area—a very rare condition. Even though the bubo suppurates, the lymphatic vessels which carry the chancroidal poison are generally spared. When they are involved there is formed usually on the dorsum of the penis a tender cord, over which the skin is reddened. The perivascular tissue becomes infiltrated and edematous and there is considerable swelling. Resolution usually takes place, but occasionally one or more points in the general swelling become more painful and red and will finally break down. The suppurating points become chancroids.

What is the treatment of chancroidal lymphangitis ?

The chancroid itself should be treated radically, as it is the depot of supply. The penis should be elevated and covered with cloths wet with evaporating lotions. The patient should be confined to bed and restricted to light diet. The bowels should be opened daily. When fluctuation denotes formation of pus the pocket should be evacuated through a small opening, the cavity washed with dioxid of hydrogen and irrigated with a 1 : 2000 solution of bichlorid, and the opening sealed

with iodoform-collodion dressing. In the case of accumulation of pus repeat the operation. If inflammatory phenomena become pronounced the abscess must be opened, thoroughly cleansed, packed with iodoform gauze, and forced to heal from the bottom. As the cavities become chancroidal, thorough curettment and applications of caustics are necessary.

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